december 1957

MACHINE AND TOOL

blue book

a hitchcock publication



THIS is No Ordinary Power Hack Saw Blade

This is the unbreakable MARVEL High-Speed-Edge Hack Saw Blade—the first bi-metal blade—invented, developed and introduced by MARVEL. This blade is a combination of two materials best suited to the requirements of an efficient hack saw blade . . . a narrow high speed steel cutting edge permanently welded to a tough, non-brittle alloy steel body. Each blade is triple tempered to assure long life and maximum toughness to the cutting edge.

With a MARVEL Blade, you can cut any material—from the free machining steels to the toughest alloys . . . fast, accurately and economically. You can tension a MARVEL Blade from 200% to 300% tauter than any ordinary blade, permitting much higher speeds and heavier feeds without deflection or breakage.

Like all good things, attempted copies of the MARVEL Blade have been numerous, but its performance has been unequalled by any of the imitators. Ask for MARVEL Blades by name and you can be sure you're getting the best on the market. Leading Industrial Distributors have them in stock.

Write for latest cutting tool Bulletin and the name of your nearest MARVEL Distributor.



FB-1028

Scully-Jones Offers

PREMIUM CHUCK PERFORMANCE

AT NO PREMIUM IN PRICE!

hase benefits	for these reasons	result from these PREMIUM features
TOOL LIFE	Breakaga reduced	7, New four-slot design increases resistance to pull-out approximately four times.
GREATER	Drills and taps	Greater number of slots permits chuck to close evenly on all sides and along shank of tool.
		3, Bore and shank are concentric within .002", gaged at distance equal to projection of standard jobber-length drill from the chuck.
	Arraracy of churk lasts langer	4. Hardened alloy steel gives you best combination of spring collet action, high torsional strength, and sustained high ac- curacy.
INCREASED	Downtima reduced	5, Improved seating and spring collet action of four-slot design facilitates easy tool changes.
		6. Four-way gripping action gives you greater protection against drill and top breakage.



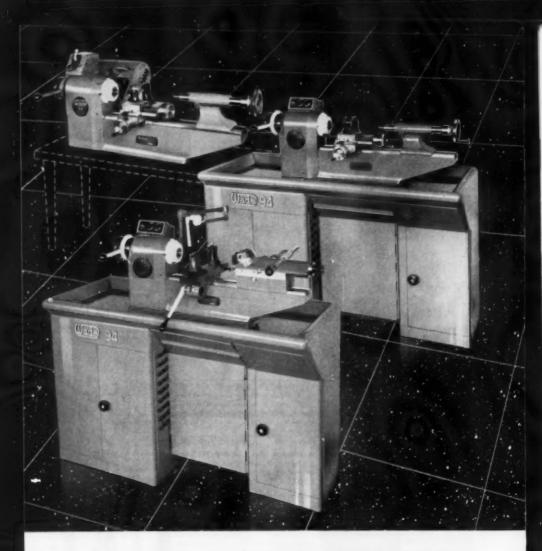
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Scully-Jones and Company, 1907 South Rockwell Street, Chicago S, Illinois

Use postpaid card. Circle No. 201

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DRILL CHUCKS



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to give you

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- · finer finish, and
- · lower cost

(Top) WADE 94 Utility Lathe (Middle) WADE 94 Finishing Lathe (Bottom) WADE 94 Electric Clutch Hand Turret Lathe

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SAVE DIAMONDS AND GRIND FASTER!

Electrolytic carbide tool grinding is a revolutionary method of fast and precise stock removal. Carbide is removed by electro-chemical action with the diamonds wiping away the products of electro-chemical decomposition. As a result . . .

80% to 90% of the cost of diamond wheels can be saved . . .

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WRITE FOR BULLETIN ON ELECTROLYTIC GRINDING

Hammond Machinery Builders

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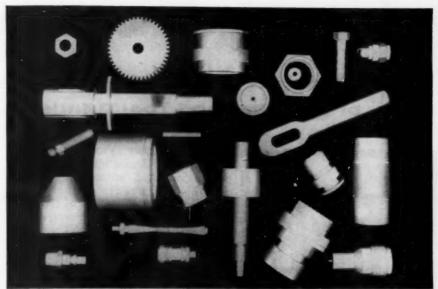
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Cincinnati gives you a choice of 5 Cutter and Tool Grinders



Whatever is good for the cutting edge of your expendable tools is good for production. And CINCINNATI® Cutter and Tool Grinders are certainly good for the cutting edges of all types of milling and die sinking cutters, reamers, hobs, taps and others. There are 5 machines in the Cincinnati group. They constitute an exceptionally strong secondary line of production equipment for machine tools of all types. Sweet's Machine Tool File contains brief specifications. For complete data write for catalogs.

THE CINCINNATI MILLING MACHINE CO. CINCINNATI 9, OHIO

NO. 2 Cutter and Tool Grinder Catalog No. M-2004



NO. 1 Cutter and Tool Grinder Catalog No. M-1852-2

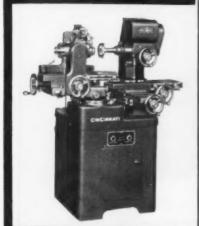


Efficiency

CONTOUR

Cutter and Tool Grinder Catalog No. M-1918-1





MONOSET

Cutter and Tool Grinder Catalog No. M-1591-4



PROJECTO-FORM

Grinding Machine
Catalog No. M-1612-5

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MILLING MACHINES • BROACHING MACHINES • CUTTER AND TOOL GRINDERS • SPECIAL MACHINE TOOLS • METAL FORMING MACHINES • HARDENING MACHINES • CUTTING FLUID • GRINDING WHEELS

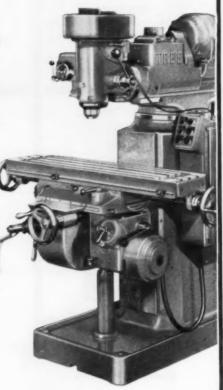
the new tree 2VG mill



12 Geared Speeds

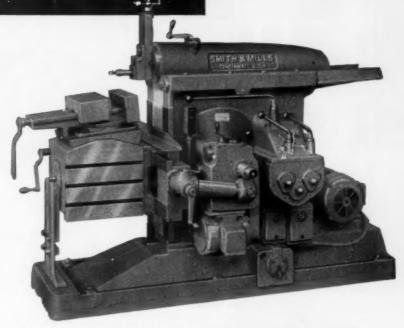
The TREE 2VG Vertical
Mill provides unusual
capacity and rigidity; 12 geared
speeds ranging from 50 to
2500 RPM; a geared-in-ram
mill having capacity to
handle cutters up to 4"
diameter and with 6" quill
travel. Ram is dovetail
type with integral gear box
and 3 H.P. motor mounted.

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TREE TOOL AND DIE WORKS

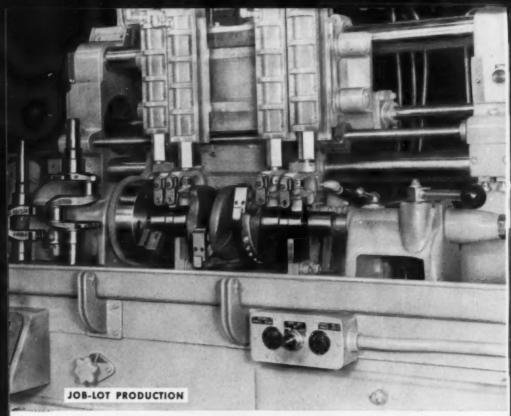
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No. 51A General Purpose Superfinisher

CRAMKSHAFTS in small job-lots are Superfinished with this setup—holding the piece between centers and driving from a keyway with a faceplate driver. Latch-on follower-type arms Superfinish the crank pins, while the main bearing and oil seal surfaces are Superfinished by standard overhead quills. Main and pin bearings are taken from a ground surface of 30 micro-inches down to 8 or less. Oil seal surfaces on shaft enda are Superfinished to 4 or less. Production: 44 to 53 pieces per hour at 80% efficiency.

NEED SMOOTHER SURFACES AT LOW COST? See the



BEEN LOOKING FOR AN INEXPENSIVE PROCESS

to improve product quality—to help market your product easier against increasing competition?

Gisholt Superfinishing may well be your answer ...it has been for some time for a long list of leading manufacturers.

With this modern process, you'll definitely reduce or even eliminate—the cost and time of grinding, polishing or buffing operations. With the exclusive Gisholt Superfinishing method, you utilize a "scrubbing" effect through an abrasive stone which oscillates as the work rotates. Chatter marks, grind-



No. 4 Superfinisher Attachment

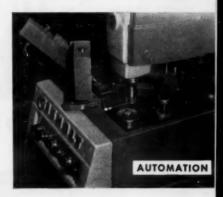
AXLE JOURNALS for railroad switchers are Supnished with No. 4 Attachment on Gisholt Saddle Type Turret Lathe in this operation. In three steps, lathe finish of 200-250 micro-inches RMS is reduced to final surface finish of 8-10 RMS, removing .004' to .005' stock to eliminate tool marks, Through Superfinishing, 25 switchers logged 30,000 trouble-free hours on journals in first few months,





No. 81 High Production Superfinisher

CAST IRON VALVE TAPPETS are Superfinished in long runs on this job, featuring fully automatic handling with a work transfer device. Cup-shaped stones are used, Superfinishing from flat ground surface down to 5 micro-inches RMS or less-and rotating off center to generate .005' crown on the cam end of each tappet. In only 16 seconds floor-to-floor time per piece, the valve tappets are economically Superfinished for longer wear life and better product quality.



NEW GISHOLT MASTERLINE SUPERFINISHERS

ing flats, and amorphous "smear" metal left by grinding are completely removed. The true base metal is exposed - providing longer wear and better performance from your product.

Better still, most Superfinishing jobs are done in a fast, automatic cycle-producing very low microinch surface readings in the shortest possible time.

The jobs shown here are typical examples where Superfinishing solved production problems and improved product quality. Ask your Gisholt Representative to tell you about them—and many more
—in full detail. Call him today! WRITE TODAY for 30-page illustrated booklet "Superfinishers," explaining Gisholt Superfinishing process in interesting detail.





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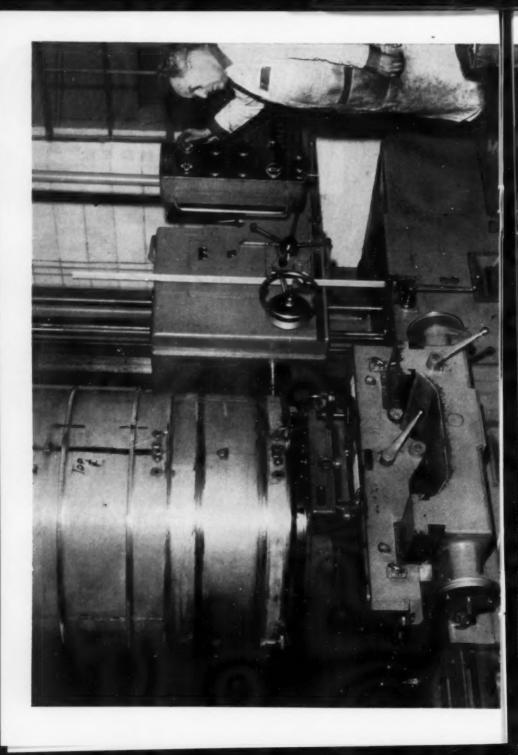
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AKRON 9, OHIO



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...you should he using **APEX** SOCKETS



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Apex, where special nut running problems are solved every day, has the answer to your fastening problem, routine or special. In our Catalog 29-R, you'll find over 5,000 types and sizes of standard nut running tools and a frequently-repeated note that reads, "We quote promptly on specials," Write, on your company letterhead please, for your copy.





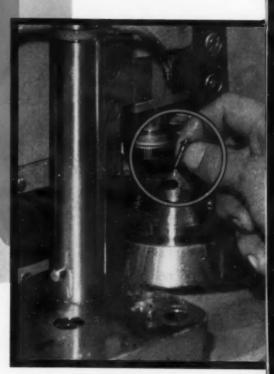
MORSE TWIST DRILL & MACHINE COMPANY . NEW BEDFORD, MASS, A DIVISION OF VAN NORMAN INDUSTRIES, INC.

"...with the hope that the True Spirit of Christmas may return to the earth and its peoples ... "

PELLOWS 3' PINE-PITCH GEAR SHAPER

Lowers Pinion

WITH FELLOWS



Speed and accuracy of the new 3" machine increased production of this pinion from 55 per hour to 120.

THE PRECISION LINE

Production Cost from 16.9¢ to 6¢ each!

FINE-PITCH PRODUCTION EQUIPMENT





Fellows No. 4 Fine-Pitch Red Liner Inspection Instrument gives proof of accuracy.

Here's an example that shows how Fellows machines pay off in lowered gear production costs. This small pinion is manufactured for a major instrument maker on a Fellows 3" Fine-Pitch Gear Shaper.

Production is 120 pinions per hour, more than twice the production of previous machines. In addition, pieces are automatically deburred, eliminating an operation. Result: the cost per pinion is 10.9 cents lower than before!

Fellows 3" Fine-Pitch Gear Shaper cuts within close tolerances at speeds up to 2,000 strokes per minute. The Fellows No. 4 Fine-Pitch Red Liner inspection instrument gives chart-recorded, permanent proof of the accuracy of the product.

For full information about the Fellows Precision Line of gear production equipment from 1/16" P.D. to 120" P.D. - contact your Fellows representative. Write, wire, or phone any Fellows office.

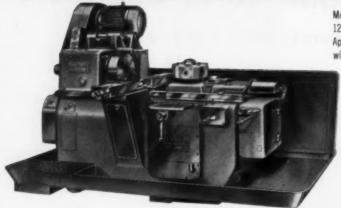
THE FELLOWS GEAR SHAPER COMPANY, 8 River Street, Springfield, Vermont. Branch Offices

1048 No. Woodward Ave., Royal Oak, Mich. 150 West Pleasant Ave., Maywood, N. J. 5835 West North Ave., Chicago 39 6214 West Manchester Ave., Los Angeles 45

Hows Gear Production Equipment

SINGLE SPINDLE AUTOMATIC CHUCKING MACHINES

Manufactured by World Famous BSA Co.



Model 95C 12" Chuck Approximately \$18,800 with Standard Tooling

Model 5M

7½" Chuck Approximately \$12,400

with Standard Tooling

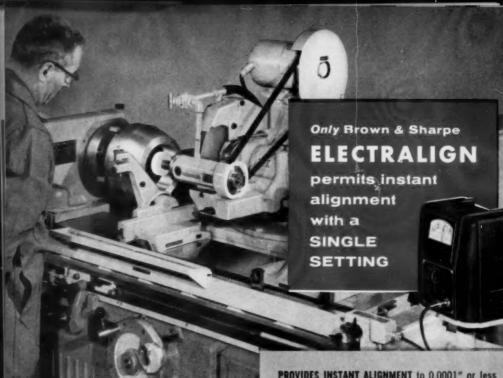
LEADING FEATURES of Model 5M

- —Extreme rigidity—one piece bed and headstock construction.
- —Independent meters—for spindle drives and rapid motion to cross slide and turret slide—eliminates clutch, reduces shaft wear etc.
- Main motor operates only when producing work.
- —Simplicity of set up—suitable for small batch work.
- —Speed changes can be made "under cut". Useful on multiple diameter components.
- —Spindle runs reverse with normal feed for tapping.
- —Features of Medel 95C include fifth turret station, increased speed range, simplified electrics, turret adjustment, greater turret stroke, increased stroke of cross slides, turret indexing by Geneva mechanism, increased horsepower in main motor. Also three automatic speed changes under cut.



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A DEPENDABLE "WATCHDOG" that indicates any change in original alignment requiring readjustment. Alignment can be instantly restored.

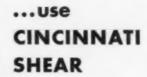
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or more in SET-UP TIME

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MOON-MAKERS*



It's common knowledge that the United States is preparing to launch a "made in U. S. A." companion to Russia's Sputnik I, and join in the search for knowledge of outer space. The magnesium alloy sphere that will soon be orbiting over us was produced by Brooks and Perkins, Inc., experts in solving difficult metal fabricating problems. And the Shear that cut the blanks that became the sphere is a Cincinnati.

Brooks & Perkins states that performance of their Cincinnati has been "excellent." Their machine, like all Cincinnati Shears, combines micrometer accuracy with high speed operation. Straight and parallel cuts are consistently produced, so accurately that only a micrometer can detect any variation in width of the sheared piece.

This accuracy doesn't call for special skill or manipulation on the part of the operator. As a matter of fact, Cincinnati Shears are built to cut all thicknesses, from thin material up to capacity, without changing knife clearance. This prevents accidental damage and eliminates interruptions in production.

Dependability, equally important, is insured by Cincinnati interlocked construction. No welds are used as load supports, yet the bed is directly supported by the housings. All-steel frame members minimize deflection.

The sketches at the right show a few important features. For full information write Department H for Catalog S-7R.

*Photos courtesy of Brooks & Perkins, Inc., Detroit, Michigan



THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS - SHEARS - PRESS BRAKES



Some Important Standard Features



Interlocked construction means no welds used as load supports



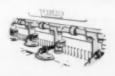
Gap frames allow shearing pieces longer than the machine



Inclined ram offsets the thrust caused by shearing action.



Front-controlled power back gauge is accurate, fast, convenient.



Hydraulic holdowns exert tons of pressure, insure accuracy.



Different gauges, held with same tonnage, can be cut together.

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Thread Milling
Machine . . . for precision, long and short
traversing, elevating,
cross feed and lead
screws . . . AUTOMATICALLY.

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MACHINE TOOL BUILDERS SINCE 1896

The Coulter Machine Co.

140 James St.

Bridgeport 5, Conn.

END MILLS ARE OUR BUSINESS . . . NOT A SIDELINE



TO BEST SERVE YOUR NEEDS ...

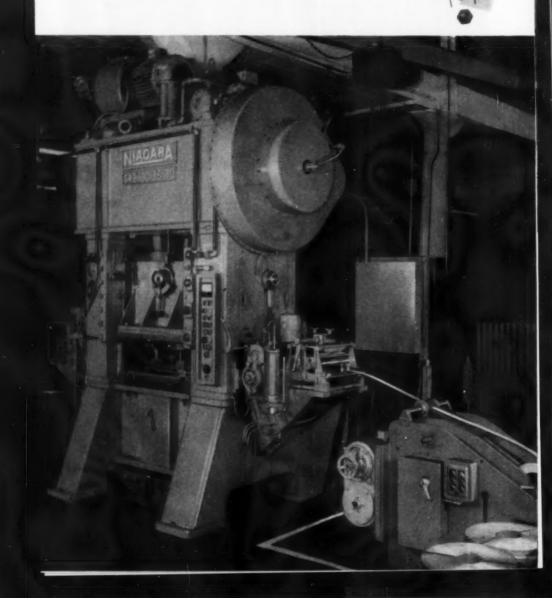
For over twenty years our designing and manufacturing abilities have been devoted to producing highest quality end mills. Because end mills are our business, we realize that universal acceptance of our product is obtained and maintained by continuously supplying the best end mills available. Putnam manufactures and stocks over 1400 standard types and sizes of end mills. Thus, you can quickly and economically select the exact size and type to best meet your needs.

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to give you more stampings per hour at less cost...in long and short runs

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KING SIZE CRANKSHAFT AND CRANKPINS — substantially larger than those on traditional straight side presses.

ENTIRE DRIVE IS HEAVIER — gears, electro pneumatic friction clutch, brake, flywheel and motor.

EXTRA BEARINGS — for better support of crankshaft, feed take-off and main gear (or flywheel).

MASSIVE, EXTRA HEAVY FRAME — all steel, 4-piece, tie rod, box type construction (bed, uprights and crown) built to absorb shock and vibration, and provide greater resistance to deflection. Up to 100%

heavier than regular straight side press construction. Uprights extra wide to house electrical and circulating oil controls.

RIGID, EXTRA REINFORCED, BOX TYPE SLIDE remains in precise alignment with bed.

EXTRA LONG, SPECIAL SQUARE GIBS guide slide precisely.

LAMINATED, NON-METALLIC WAYS positively prevent welding or galling of bearing surfaces.

AUTOMATIC CIRCULATING OIL SYSTEM keeps all press bearing surfaces continuously lubricated.

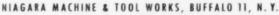
ULTRA-MODERN AUTOMATIC FEED perfectly mated to press.

EXCLUSIVE NIAGARA MECHANICAL ROLL LIFTING SYSTEM — built into the press for independent, infinite adjustment of ingoing — outgoing rolls, from floor level.

OVERSIZE ADJUSTABLE AIR COUNTERBALANCE for smoother, safer press performance.

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THE FULL STORY is unfolded for you, feature by feature, in new, illustrated Bulletin 264. Write for your copy today . . . then consult a Niagara representative.



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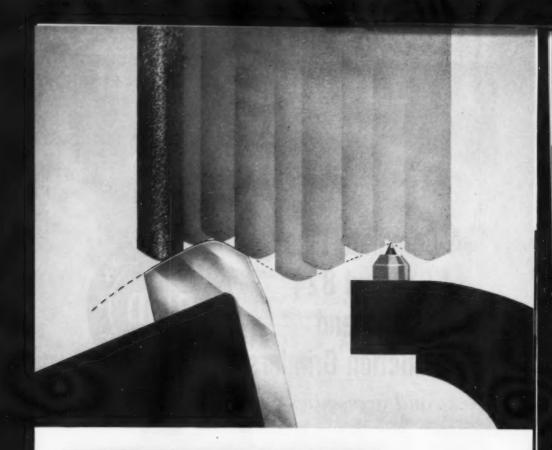
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December, 1957

REID PRECISION SURFACE GRINDERS REID PRECISION SURFACE GRINDERS

33



Oliver AUTOMATIC Face Mill Grinder

Wheel dressed with every stroke



Oliver face mill grinders are made in four sizes to accommodate cutters from 4" so 21" diameter.

The drawing above shows the grinding wheel passing over a cutter tooth after being dressed and formed automatically by a fixed diamond. This happens with each stroke of the Oliver automatic face mill grinder. Thus, complete accuracy of grind is certain regardless of the number of teeth in the cutter. This exclusive Oliver of Adrian feature prevents loading of the wheel and also permits carbide grinding with a silicon carbide wheel. Automatic feed-down accurately compensates for each dressing thus providing a fixed grinding line.

The machine automatically indexes the cutter and controls the tooth shape by a simple cam arrangement so that any practical roughing or finishing form can be obtained. The machine grinds the corner angle, corner radius, face and dish all in one operation. Oliver's face mill grinder is hydraulically operated for smooth, fast (4 to 8 times faster per cutter), accurate and quiet performance.



OLIVER Automatic

. . . features real economy and fast, accurate grinding. One operator handles several machines. Set-up is simple. The cutter is mounted on the face plate and the automatic indexing mechanism adjusted. Required clearance is set by moving the work spindle to the desired position. All surfaces and radii are ground in one continuous operation.



OLIVER General Purpose FACE MILL GRINDER

... heavy duty; for all types of face mill grinding on coarse and fine pitch cutters from 4" to 24" in diameter. All angles and clearances are instantly obtained without calculation. The cutter face, periphery and corner angles may be ground without altering the lip rest setting. The machine is completely universal.



OLIVER Arc Radius GRINDER

. . . for accurate sharpening of face mills, channel cutters, slotting cutters, etc. The face, periphery and corner radius are ground with one pass of the wheel: radius blended in perfectly. The machine will sharpen any radius up to two inches. Periphery clearance may be greater than the face. If desired, the machine will give a straight grind. High speed, diamond wheels may be used.

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"Ace" Universal Tool and Cutter Grinder ☐ Die Making Machine
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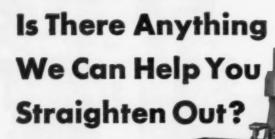
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Manufacturers with straightening, checking, and truing operations that require more than ordinary speed and accuracy have found Anderson Power Presses to be the answer to their problems. Here are the results they report:

"Straightened 30 pieces per hour with former equipment. With Anderson Press, 120 per hour. Production increase 400%."

"Anderson Power Press with its complete attachments is definitely more flexible for all types of straightening operations. It is faster, more accurate, and pressure is easily controlled. It is simple to operate."

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These actual reports from users prove that with an Anderson Power Press you get it straight — fast. Profit from low-cost high production, precision straightening.

Write for Bulletin 12-5



ANDERSON BROS. MFG. CO.

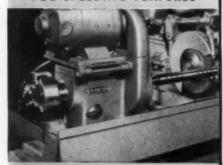


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Spicialists in Circular Cutting Tools Since 1922

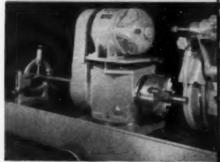
Norton builds extra versatility into universal grinders...

JOB-SPEEDING FEATURES



Chucks may be left mounted on one end of the headstock.

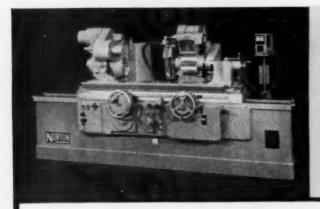




Hollow headstock spindle increases capacity for grinding long bars.



Hinged-bracket type internal grinding spindle greatly speeds setups.



Norton 14" Type U-4 universal grinder. Norton also builds universal grinders in 12" and 10" sizes 10" sizes. swiva-LIGN* Dual Electric Indicator, at right of picture, measures swivel table adjust-ment and is optional on all.

Norton universal grinders are rated as practically "complete grinding departments." These popular machines handle many different types of grinding - external, internal, face, taper and angular wheelside - they are built with many famous job-speeding, cost-cutting features. For example:

Extremely rapid chucking . . . quick change-over to live or dead spindle oberation . . . easy work speed changes . . . independent wheel settings that do difficult jobs fast . . . extra capacities on wheel head and headstock . . . precise swivel table alignment with SWIVALIGN Dual Electric Indicator, an optional extra to eliminate cut-and-try.

Norton universal grinders are made in exactly the size you need -10", 12", 14" and 18" swing capacities and in lengths from 20" to 72" between centers — to bring you many time-and-money-saving "Touch of Gold" advantages. For complete facts on these high-efficiency machines see your Norton representative or write us direct. And remember: only Norton offers you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass.

*Trade-Mark Reg. U. S. Pat. Off, and Foreign Countries

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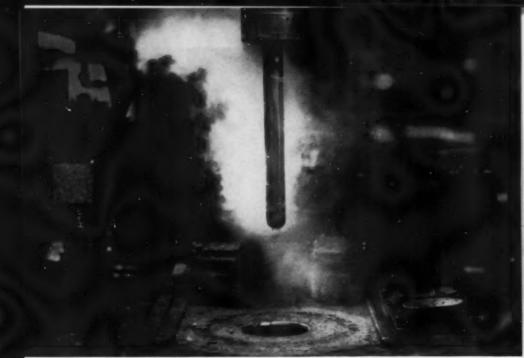
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In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5

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Behr-cat Tapes



Tough 21/2" diameter mandrel at Rc 44 on 1150 ton brass extrusion press. Scovill Manufacturing Co.

Mandrel of HALCOMB 218 retains toughness and hardness at hot work temperatures...

This mandrel is made of Halcomb 218-a tough, air-hardening hot work steel. Hal-comb 218 is suitable for tools like this which require a higher degree of toughness at moderately elevated temperatures than is obtainable with the tungsten types of hot work steels. And Halcomb 218 retains both its hardness and strength at these temperatures.

For example, at a hardness of Rc 44, Halcomb 218's Charpy Impact Strength is 33 ft-lbs at 500F. And it will retain this hardness after 1 hour, after 10 hours and even after 100 hours at temperatures up to 900F.

Properties like these cut tooling costs. The mandrel shown above is good for 1200 pushes, for example, and even then all it needs, usually, is repolishing before being used again.

Halcomb 218 is particularly useful for all hot work operations on which drastic coolants are used. It even resists breaking very successfully when water cooled in operation. If these sound like advantages you can use, call your local Crucible representative for more complete data. Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.

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- Proper Belt Tension Is Automatically Maintained
- No Tools Needed for Head or Table Adjustments



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Newly-designed "Buffalo" No. 15 bench and floor bases eliminate greaseand dirt-catching troughs and pockets around working area. Extremely sensitive for small hole drilling, these new machines are sufficiently rigid and heavy to operate at full capacity without strain or wear.



No. 15 Multiple Spindle Bench Drill

For a demonstration of the versatile new No. 15 Drill, contact your nearby "Buffalo" machine tool dealer. Or, for complete details, write us for Bulletin 4024.

The new "Buffalo" No. 15 line includes bench, floor and pedestal models (bench and pedestal types in 1- to 6-spindle models). Attachments are available for tapping, mortising, routing or spot-facing.



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Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

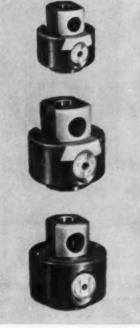
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3 NEW BORING HEADS WITH THESE OUTSTANDING FEATURES

Round-body design Cross-hole for greater range Short - compact construction Sizes — #102 has 2" diameter #103 has 3" diameter Boring range — 1/16" to 8" and larger

NEW 3" DIAMETER MODEL #203 INCLUDES THESE ADDITIONAL FEATURES

Protective cap houses all moving parts Friction lock dial face permits return to zero setting.

THESE NEW HEADS TAKE 1/2" or 3/4" SHANK BORING TOOLS AND BORING BARS

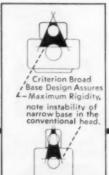
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CRITERION BORING HEADS are better because they combine utility with simplicity of design — see sketch to the right for one of many features.



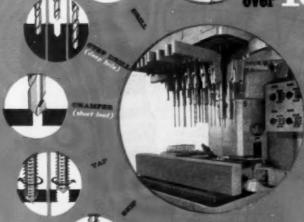


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select either of

Standard multi-spindle Natcos range from 1 hp, 10-spindle machines to 50 hp machines with up to 72 spindles, Spindles in standard Natcos are driven through universal joints and located by either adjustable arms of bored slip plates



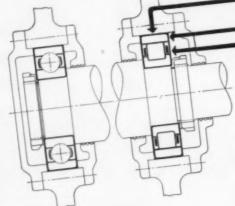
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- 6. Interchangeable with standard single row metric ball bearings.
- Available also in several extra light series where overall weight is important.

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- Outer ring rigidly clamped endwise (no looseness or slippage in housing).
- Rollers move endwise as shaft expands.



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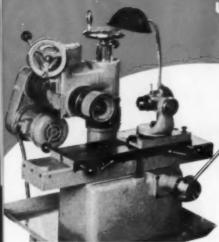


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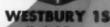


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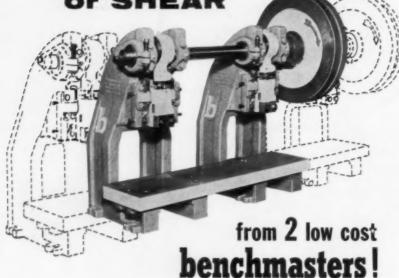
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- Can easily be moved or changed to another machine always ready for immediate use
- · Low in height for extra clearance on machine
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MODEL	DIAMETER (IN.)	HEIGHT (IN.)	WEIGHT (LBS.)	PRICE
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*6	6	21/4	13	190.00
8	813/4	21/4	22	200.00
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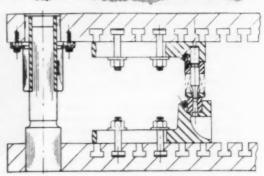
Dealer inquiries invited

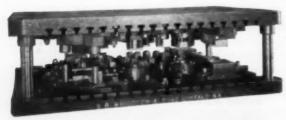


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Above: Sectional drawing of a Whistler adjustable punch and die unit assembled in T-slot die set.

At the left: A completely assembled Whistler adjustable die ready for the press.

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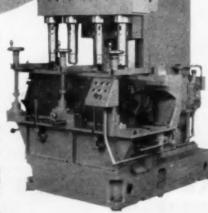
PHOTO COURTESY MOLINE TOOL CO.

Moline Tool Company received an order to make a four spindle hydraulic rail feed cylinder boring machine you see at the right.

Like so many other manufacturers of precision products, Moline profited by the skill of veteran Lehmann-Fulton engineers and machinists who supplied the necessary boring tools.

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- Automatically compensates for both angular and parallel misalignment.
- Eliminates bell mouthed and over-sized holes—permits extremely close tolerance work.
- Free and easy movement . . . tool holder sleeve and shank float independently of each other.
- Amount of float is infinitely adjustable.
- Smoother running . . . moving parts ride on rollers.
- Minimum of maintenance...holder has only five parts.





Standard equipment with leading Machine Tool Manufacturers. Tool Holders and Tap Holders are available with either straight or tapered shanks.

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- Automatically corrects parallel and angular misalignment.
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- Wide range of float—simple adjustment locknut provides accurate control of degree of float.
- No springs or pivot members to restrict float.
- Floatation feature makes it easier to hold close tolerances.







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If you're all tied up in knots over the high cost of operations, there's an easy way for you to break the tension. Put CIMCOOL' to work in your plant and dreams of increased production and lower costs will become realities. You'll relax with the knowledge that CIMCOOL Concentrate is taking care of your cutting fluid problems. Here's why:

CIMCOOL LOWERS COSTS because it's longer lasting in machines. Thus, it reduces downtime and cuts labor costs for cleaning and changing.

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Di-Acro Shear No. 4
with optional Micrometer Gauges.



"We hold tolerances of ± .002" with our Di-Acro Shear," reports Richard Hodges, foreman at Consolidated Electrodynamics Corp., Pasadena, Calif. Manufacturing precision electronic equipment, they work with a variety of sheet materials—fish paper, beryllium copper, phosphorous bronze, hot and cold rolled steel, aluminum, etc. "Parts must be burr-free—require no milling to assure a 'light-tight' fit."

The Di-Acro Vari-O-Speed Powershear will shear up through 16 gauge mild steel, ½" in some aluminums, plastics, rubber and many other sheet materials—accurately cut strips less than .025" wide. Speed rivals that of big machines. No skilled operator required—women can operate it.

Available in two power models in 12" and 24" widths and four hand operated models 6" to 24" wide. "Quick-Set" Micrometer gauges are standard on power models, accessories on hand operated shears.

Photo shows a 16 gauge mild steel sheet sheared on a Di-Acro Vari-O-Speed Powershear No. 24—no sheet distortion.



Consult the Yellow Pages of your phone book for the name of your nearest Di-Acro distributor or write us.

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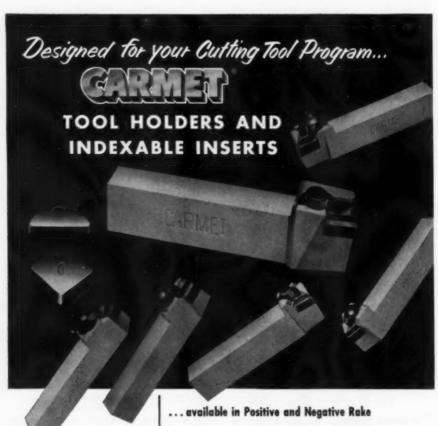
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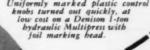
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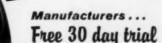
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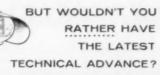


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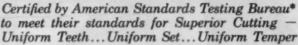
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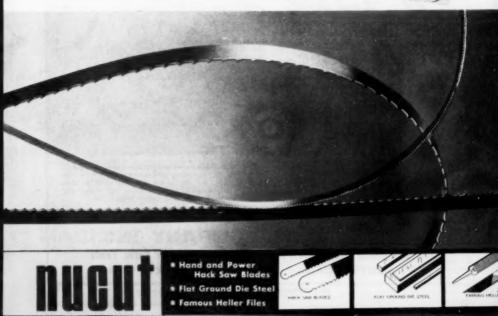
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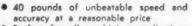
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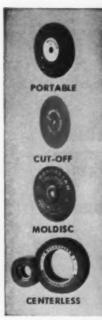
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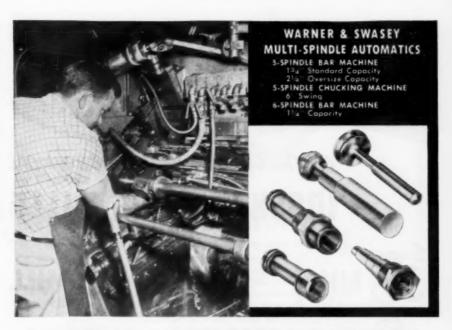
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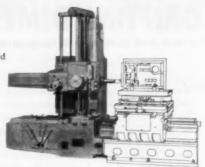
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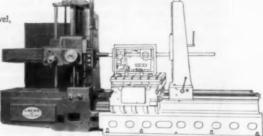
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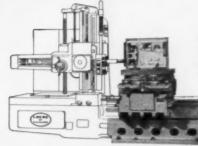
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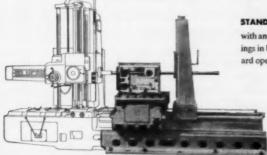
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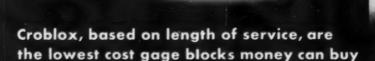
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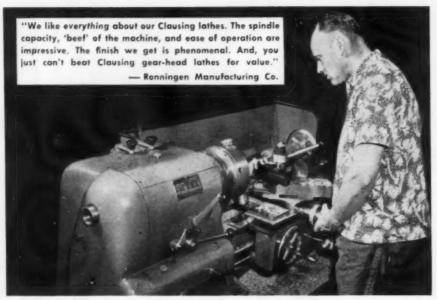




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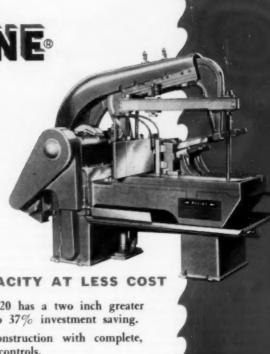
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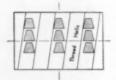


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requires
accurate
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mathematical computation of cutter form

Multiple thread milling cutters often produce a thread space form which is not a duplicate of the cutter tooth form. The cutter tooth form is not a duplicate because the cutter tooth rotates in a plane which is perpendicular to the work axis and at an angle to the thread helix. This generating action produces a fillet at the bottom of the threads, and a thread space which is wider than the cutter tooth. When the amount of generating produces an unsatisfactory thread form, the cutter must be developed to produce the desired thread tooth thickness without fillet interference.

Whenever required, Barber-Colman engineers, by mathematical computation, design the correct cutter which compensates for the generating action. In this computation, the diameter of the cutter is very important since the amount of tooth form correction increases as the diameter of the cutter increases. A thread produced by a specially-developed cutter will have an accurate form which will fit the gage with the desired bearing.



This schematic drawing shows how a multiple throad milling cutter produces a throad space which is wider than the cutter tooth. The cutter is set so that the plane of rotation of the cutter teeth is perpendicular to the work axis, and at an angle to the thread helix.



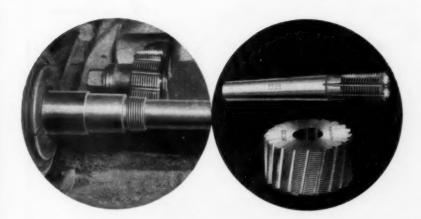
Large diameter cutters have greater length of contact and produce more pronounced fillets.



Small diameter cutters have loss length of contact and produce smaller fillets.



In some cases, cutters mill deeper than true thread form. Any generated fillets which may be cut are then below the gaging surface of the thread. Correct cutter design takes care of this automatically.



original cutter accuracy in resharpening

All Barber-Colman form-relieved milling cutters are accurately index-sharpened on Barber-Colman automatic sharpening machines, so that all cutter teeth are the same height and accurately spaced. This makes it easy to maintain original cutter accuracy when resharpening either on automatic sharpeners, or on conventional sharpening equipment using the accurately indexed cutter teeth as a reference. In either case, accurate sharpening to original tolerances is easily maintained, and cutter sharpening time is reduced to a minimum.

design elements for maximum performance

With the proper tooth form developed to cut accurate threads, the engineers then analyze the job conditions to determine which cutter features will produce best cutter performance. These features include selection of the proper cutter material, shell or shank type cutters, straight or helical flutes, rake teeth, axial relief and intermittent teeth if sharp threads are desired. Since we make all classes of ground and unground thread milling cutters, we can recommend the cutter accuracy required for your job.

When you have a threading problem, consult Barber-Colman cutter engineers for their recommendations on the proper cutters for the job. Be sure the cutters you have are accurately designed to cut the correct thread form. Send us blueprints of your threaded parts for quotation on thread milling cutters designed to produce correct threads.

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Archie operated one of the two drill presses in the maintenance department. He spent about 6 hours a day running back and forth collecting V-blocks, parallels and clamps—and making set-ups for various shapes and sizes of work. That left only 2 hours to drill.

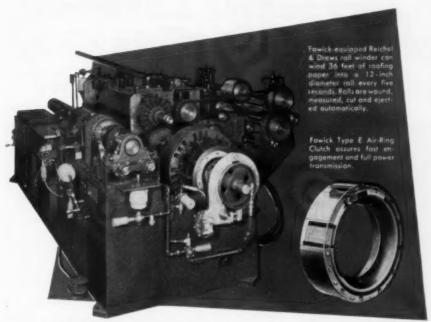
Now he drops in the work, tightens the vise and starts to drill. The other drill isn't needed any more. One drill press, equipped with the Modern Safety Drill Table, easily handles the work of two.

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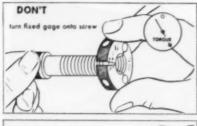


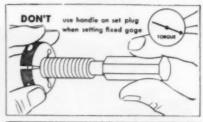
Fawick Type CS Brake provides self-energizing brake action.

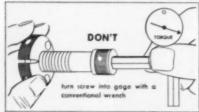


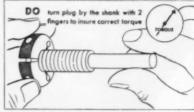
When measuring high limits

When gaging gages

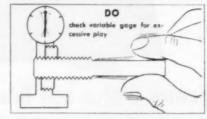












These illustrations from new SPS booklet show some of the do's and don'ts of gaging precision threads.

3A threads: what they are; how to gage them—new SPS booklet tells all

Threads made to Class 3A fit are the most precise in general use in industry. But you do not always get the 3A precision you specify. Because of many different gaging techniques that yield varying results, screws with threads well outside the Class 3A tolerance limits often pass inspection.

SPS has prepared a new booklet on this subject. It explains clearly what Class 3A threads are and the pros and cons involved in the widely varying gaging techniques in use today. It reviews the gaging of high and low limits of 3A threads, sampling techniques, and even the methods of gaging gages.

All standard Unbrako socket screw products fall within specified tolerance limits no matter what method is used to gage them. Leading industrial distributors carry complete stocks. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 52. Pa.



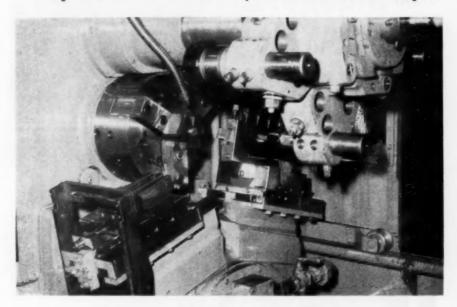
Form 2239, "Class 3A Threads: what they are; how to gage them." 16 pages, with many illustrations. Write for your free copy today.

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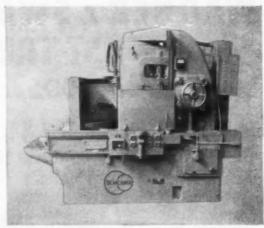
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* Although Acme does better, the guaranteed precision of Buck Power Chucks is .001"

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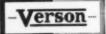
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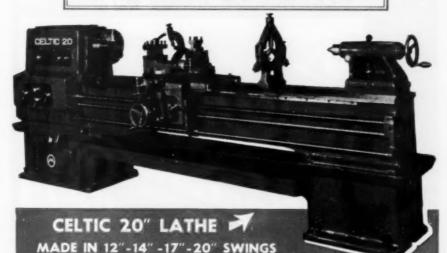
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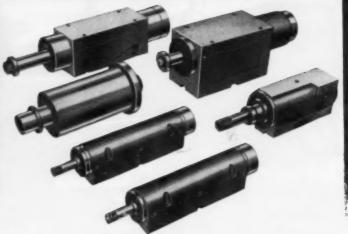
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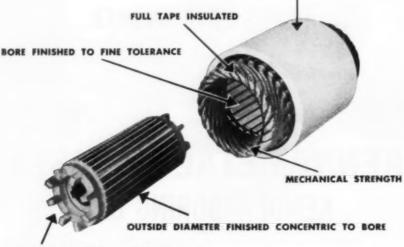


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In addition to having the overall advantages of microsize Unbrako socket screws, these screws can be used in holes tapped in soft or die cast materials without stripping threads and ruining expensive work. Also the set screws can be used with hardened shafts, since they lock against the threads of the tapped hole.

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Self-locking microsize Unbrako socket cap and set screws are available in sizes #0 through #3, in heat treated alloy steel (plated or unplated) and stainless steel, at your authorized industrial distributor. To serve you well, he also carries a complete stock of other self-locking Unbrako socket screws. Or write us for literature and samples. Unbrako Socket Screw Division, Standard Pressed Steel Co., Jenkintown 52, Pa.

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MACHINE and TOOL BLUE BOOK

News from Washington. What's the proposed legislative program for 1958? Will the military budget be altered? These and other news items make up the Round-up of Washington News. Page 107

Filler Tube Assembly. How the Hoover Company cut costs on their filler tube assembly for their electric iron by eliminating five operations is described by Edward T. Girard, the engineer who conceived the idea.

Page 125

Multi-Drilling of Pipe. Mechanical Engineer Clement F. Brown describes a low cost drill lig and set-up for producing a series of holes in pipe or tubing.Page 128

Man Made Diamonds. General Electric has so far produced 100,000 carats of man made industrial diamonds which, tests disclose, are equal to natural diamonds in every respect. Page 130

Tourna-melting vs. Welding. The well-known industrialist, R. C. LeTourneau, describes his Tourna-melting process, which is

similar to squirt welding but uses a bigger conductor, wire and teapot.Page 134

Machining Crankpins on a Transfer Line. Each of a series of simple single-purpose lathes is fed by a common, automated line for progressively machining the crankpins. Using carbide cutting tools, machine speeds have been upped from 60 sfm to over 250 sfm. Page 149

No Heat Distortion. At Michigan Tool Company, a Thompson surface grinder machines spline rollers to .0005 tolerance, because of a pressure compensating mechanism in the hydraulic system.Page 164

Has Your Question Been Answered?

At the Metals Show we overheard some questions asked at various booths about some of the new machining methods. As we are in the business of transmitting ideas to such persons we talked it over with the booth attendants. One booth attendant characterized many of the questions as "very naive."

Some of the questions might seem simple to an expert in the field, but are they? Does the expert in a revolutionary machining method have a clear understanding of the problems encountered by engineers who are experts in the art of machining materials?

It's one thing for a company to initiate a research and development program to solve the problem of excessive machining times. The companies that do not have such a program need specific and detailed information if their thinking is going to be in the right direction.

The person who thinks that numerical control, for instance, will replace tracer control needs the benefit of objective analysis and evaluation of the two systems. If he is given the facts with respect to his particular application, he will see that some conditions

are favorable to one system; different conditions favor the other. This requires better communications.

Better communications is required to correct some of the thinking on chemmilling and spark machining. These methods are here to stay, but the engineer working on complex shapes and machining high strength materials needs to know the economics involved as well as the limitations inherent in these new processes compared to conventional machining.

A conference such as the Contour Machining Conference sponsored by True-Trace Corp., is one means for promoting understanding between the expert on a new method of materials removal and the larger group of persons skilled in the art of machining. The business press can do much toward promoting understanding between the two factions.

We think the article by Alfred H. Petersen, Lockheed aircraft engineer, (see page 113) is a realistic approach toward answering some of the questions.

—Paul A. Meline

Managing Editor

No other machine of comparable size can equal it for

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Dec. 5-6—12th Annual Industrial Productivity Conference Illinois Institute of Technology, Chicago, Ill.

Jan. 20-24, 1958—American Institute of Electrical Engineers Winter General Meeting, Hotel Statler, New York, N.Y.

Jan. 27-30, 1958 — Plant Maintenance & Engineering Show. International Amphitheatre, Chicago, Ill.

Feb. 4-5-6, 1958—13th Conference of the Reinforced Plastics Division of The Society of the Plastics Industry, Inc. Edgewater Beach Hotel, Chicago, Ill.



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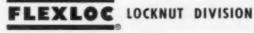
Where products must be reliable . . . must stand up under vibration, temperature extremes and hard use . . . designers specify rugged, reliable, precision-built FLEXLOC self-locking nuts.

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STANDARD PRESSED STEEL CO.





I received the October issue of your MACHINE and TOOL BLUE BOOK and I am greatly interested in the article "Educating Engineers," written by your Managing Editor, Paul A. Meline, as told by Frederick L. Hovde, President of Purdue University.

I would be pleased to have you forward six reprints of this article, which I can use to very good advantage.

Malcolm S. Mackenzie, Plant Engineer, Behr-Manning Company, A Division of Norton Company

Grinding at Solar

Thank you very much for sending us copies of the reprint from your September 1957 issue of BLUE BOOK on the article "Grinding Applications at Solar Aircraft." . . . We are going to have a sales conference in our plant the first part of next month and these brochures will be of immense value to us in pressing a few points.

Mr. W. A. Ferguson
The Standard Electrical
Tool Co.
Cincinnati, Ohio

Die Chaser Threading

The two-part article which appeared in the August and September issues of the MACHINE and TOOL BLUE BOOK aroused a great deal of interest in our company. The article entitled "Die Chaser Threading and Sharpening" by W. C. Couts was printed at the

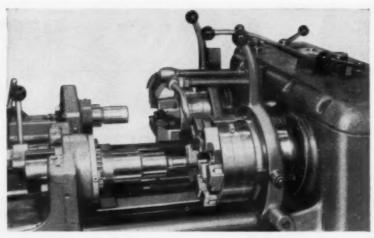
time when die chaser sharpening and threading was a major problem in our company.

EINAR P. JENSEN,
METHODS ENGINEER
WARD TOOL & MACHINE Co.,
INC.
Alden, New York

Numerical Control

of Numerical Control" article is available, I would appreciate receiving it. We are adding a new line to our present product and believe this would be an excellent time to start the numerical control. Any help that you can give us on the numbering of these parts in classifying them would be appreciated.

A. F. BAUM CHIEF ENGINEER HENRY WEIS MFG. Co., INC. Elkhart, Indiana



3/4

-4.320" Threading Range with one LANDMACO machine

The Twin Disc Clutch Company Hydraulic Division in Rockford, Illinois, is able to thread workpieces from 3/4"-32 pitch to 4.320"-12 pitch with one LANDMACO Threading Machine.

Fine-pitch large-diameter threads are cut on the right-hand spindle by a 40RX LANCO Head of 2½"-9½" range (5½" bore). A 2½" R LANCO Head of ½"-2½" range is used on the other spindle to produce coarse pitches, small diameters, and long thread lengths.

The 40RX Head is threading C1045 steel clutch output shafts heat-treated to 229-269 Brinnell hardness. Cut to within 14" of the shoulder, the .830" long special 12 pitch UN thread has a 3.669"-3.676" pitch diameter tolerance. 15 pieces are threaded per hour, including 100% gaging. Even with exacting thread finish requirements, 100 pieces are produced between chaser grinds.

Special workholding fixtures (interchangeable with standard vises) are a major factor in the machine's versatility. The carriage fronts illustrated allows large diameter threading well beyond the normal machine range. Ask for Bulletin F-80 or F-90 (Die Heads) and H-76 (LANDMACO Machines).

457-2

LANDIS Machine COMPANY



"National Steel quotes prices as near as its competitors and as much as they quote. We'd be ashamed of ourselves if we didn't. Now is the wrong time to cut steel prices. We will not consider a price change of any kind, either up or down, until the company has a better idea of the impact of higher wages and other costs on its earnings."

Former Treasury Secretary Humphrey Chairman of National Steel Corp.

Proposed Legislative Program for '58

Part of the administration's proposed legislative program for the 1958 session of Congress has been drafted by President Eisenhower and his advisory staff.

It is reported that these tentative proposals indicate heavier spending for military missiles, which, it is thought likely, Congress may increase. To offset this increased expense, there will be economies in conventional weapons and manpower.

The President will also:

- Avoid outright advocacy of a tax cut in his message to Congress.
- Recommend extension of the reciprocal trade act for another five years.
- 3) Ask for additional powers to cut tariffs.
- 4) Urge an increase in postal rates, permitting a small pay increase for postal workers.

5) Propose some liberalization in the social security program.

Sen. McClellan Asks Meany for Proposals

Sen. John L. McClellan (D.-Ark), chairman of the special Senate committee on improper activities in labor management relations, wants the "benefit of any suggestions" AFL-CIO Pres. George Meany might care to make prior to proposing legislative recommendation. The Senate committee expects to file an interim report early in January, 1958.

"There are elements in labormanagement relations that obviously neither observe or respect standards of common honesty and decency," McClellan said in a letter to Meany.

Meany replied that he will propose legislation "in the area" investigated by the committee after consulting with presidents of all AFL-CIO unions.

Military Budget to be Altered?

To free more funds for scientific research and development, the Administration is attempting to revise the military budget, eliminating items not directly related to protecting the nation from the type of war the future might bring. Some believe, for example, that the \$1 billion spent each year for the maintenance of forces in Korea might be more wisely spent for inter-continental missile work.

One segment of the Administration's critics favors shooting the works on defense in the light of present developments, letting the budget go by the board. It is extremely unlikely that such a drastic step will be taken at this time. The President is determined not to risk running the Government in the red by pouring billions more into the satellite and missile program. He maintains that defense spending must be curbed at 38 billions this year, instead of 40 or so, or an

unbalanced budget, deficits, and inflation will result.

Look for possible tax cuts from reduction in non-military spending, such as farm supports, foreign aid, export-import bank, and stockpiling. Some reports indicate a savings of nearly \$5 billion, enough for a major tax reduction, might be realized from these sources.

Government Nickel Goes to Industry

Gordon Gray, director of defense mobilization, has authorized the diversion to industry of all nickel scheduled for shipment to the Government in 1958. He said the diversion was made possible by the continuing improvement in the defense position for nickel.

As a result of the decision, approximately 135 million pounds of nickel, both market and premiumprice, will be made available to the civilian economy next year. According to estimates of the Department of Commerce, this diversion will increase to 245 million

"The Kremlin has effered us a direct challenge. It proclaims to the world that a slave economy can out-produce a free economy. That's why the U.S. must show the small nations who are the targets of the cold war that its way is best. I am confident that we can meet and defeat this challenge provided we base our policies on the recognition that the most productive source of economic progress is private rather than Government enterprise."



Handles for the gold-plated (left) and standard "Heavy" (center) Gillette safety razors are made from Anaconda leaded commercial bronze special-shape seamless tube, 4525° O.D., 371° I.D. "Regular" model (right) is of commercial bronze 395° O.D., 324° I.D.

Gillette shaves costs with Anaconda special-shape tubes

The problem: The Gillette Safety Razor Company, Boston, Mass., formerly used drawn shells for the handles of its famous line of razors. Press-fit assembly of components called for very close tolerances and suppliers of the drawn shell had difficulty in controlling the dimensions to the accuracy required. Rejects and production delays were becoming a costly problem to Gillette, and there was also excessive waste of material in trimming the shells after the knurling, grooving and rolling operations.

The solution: American Brass Company representatives suggested the use of special-shape (fluted) tubes to meet the tolerances required—in alloys suitable for the machining operations. Gillette tried the idea and now uses Anaconda specialshape tubes for handles of three models.

Long lengths of the tube are fed into high-speed, multiplespindhe machines which automatically convert the tube to razor handles ready for the plating room. Production is greatly increased, rejects and waste material are reduced to a minimum, and the uniformity of the handles simplifies assembly. Most important of all to the Gillette Safety Razor Company is the improved quality of the finished product. Sove Moterial and Production Costs: Special-shape seamless tubes—of copper, copper alloys or aluminum—in standard lengths, or cut to specified lengths, can save several steps in arriving at a finished product. The American Brass Company's French Small Tube Division are specialists in producing small tubes (up to ½ "O.D.) of special design and, in addition to maintaining a wide range of stock dies, are ready to cooperate fully in the development of new shapes to meet specific requirements.

For Action: Contact our nearest District Sales Office or send a sample, drawing or description, estimated quantity, kind of metal required and other pertinent data to: The American Brass Company, French Small Tube Division, Waterbury 20, Conn.



SPECIAL-SHAPE TUBES

Made by The American Brass Company



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pounds the amount of nickel expected to be available for nondefense uses in 1958, an increase of about 18 million pounds over 1957.

Full diversion of nickel has now been authorized for the second successive year. As a result of the 1957 authorization, an estimated 117 million pounds of nickel was diverted to industry during the current year.

SBA Loans Rise

Increases of 35 percent in number and 76 percent in dollar amount of Small Business Administration loan approvals during September 1957, compared with September 1956, have been reported.

During September 1957, SBA approved 271 loans totaling \$13,275,-000 to aid small firms, as compared with 201 loan approvals for \$7,531,000 during September a year ago. September 1957 loan approvals were sharply above the August total of 187 approvals for \$7,014,-000, but considerably below the peak month, December 1956, when 345 loans totaling \$18,154,000 were approved.

President to Attend N.A.T.O. Council

Russia's recent accomplishments in the conquest of outer space have given members of the North Atlantic Treaty Alliance added impetus in their efforts to pool scientific resources. This work was set in motion by President Eisenhower and Prime Minister Macmillan at their White House meetings in October. The President is planning to attend the December meeting of the N.A.T.O. Council at Paris to help promote enthusiasm for closer scientific work.

Dr. Fred Whipple, director of the Smithsonian Astro-Physical Laboratory, said that he believes the Russians will be able to send a man into outer space "in the very near future."

"It all depends upon whether they would be willing to send up a human volunteer and not be concerned about his getting back," adds Col. John Stapp, chief of the aero-medical field laboratory of the Air Force Air Research and Development Command.

Advice on the operation of a business, covering such subjects as bookkeeping, sales, advertising, is available from the Small Business Administration. The nearest SBA branch will place your company's name on their mailing list. Also available are booklets which tell how to sell to Government, and some which describe new inventions.



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DON'T buy "bargain-price" special die sets!

When you need a special die set, it's usually for an expensive die . . . one you really should protect. The few dollars extra you may pay for a "Detroit-built" special are the cheapest insurance you can have.

Protection for your costly dies is built into every Detroit die set—standard or special—and we've been doing it for 30 years.

Believe us—there is a lot more to a good special die set than some steel plate and a few pins and bushings. Sure, you can buy cheaper die sets, but they can be awfully expensive, too.

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- Less machining is usually required to finish a flame-cut part. Sometimes machining is eliminated altogether.
- Freight costs lower—If you're now paying freight on steel you later scrap you may well be able to pay for flame cutting with the money you save by shipping lighter

flame-cut parts. The blank for a 6' disc is 49% heavier than the disc itself. Storage and handling expenses are reduced, too.

- Less time in process—You can often convert finished products into cash more
 quickly because parts can be produced
 faster by flame cutting.
- No loss on spoilage or rejects—They're our problem—not yours.
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For those advanced aircraft structures . . .

How Will We Shape the New Materials?

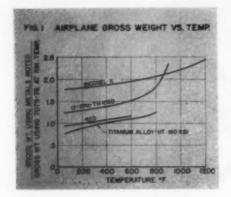
Mr. Petersen warns that any person who forecasts future military requirements, or the designer's approach to getting the aircraft performance these requirements will demand, is going to find himself in the awkward position of attempting to justify his guesses simply due to the fact that there is not, at this time, any firm knowledge as to what the future, meaning the next 10 years, will develop.

The author concludes that the transition to stronger and tougher alloys than are being used today is going to be a slow process where airframes are concerned and for the next five years, at least, will not be completed. But in the field of machining, where great strides have already been made in shaping and automatic controls during the past few years, a still greater effort must be expended in research and development and into faster and more efficient machines, tools and techniques.

By Alfred H. Petersen, Group Engineer Producibility Methods Lockheed Aircraft Corporation California Division

● The one thing we know about supersonic flight is that airplanes operating at speeds above 2½ times the speed of sound will get hot. This heat will be variable over the surfaces. How hot depends on a number of factors. The speed, the duration of flight at this speed, the altitude at which the speed is accomplished, and the aerodynamic efficiency of the vehicle. Today, our missile designers are breasting the so-called thermal barrier and the manned airplane designers are right on their tails.

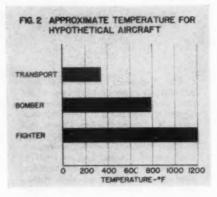
Last year, Joe Famme of Convair, introduced the producibility barrier to the second annual conference and emphasized a factor



which should be of immediate concern. Namely, what can be done to get the weight of steel airframe components down to a reasonable figure. This problem is considered very real if it is conceded that hot airplanes must be fabricated entirely of steel and titanium and if the same tolerances are assumed for the same types of structure now being produced in aluminum alloys. The simple fact that steel weighs about three times as much as aluminum thus presents an intolerable weight situation. If the steel is of low strength, the structural weight further increases; hence, the gross weight also goes up. Figure 1 illustrates the effect of increased structural weight on airplane gross weight for some of the materials used today in hot areas when compared to an aluminum alloy at room temperature. On this basis, an airplane suitable for 600° F. can be

What materials will be used

expected to weigh 1½ times as much as its aluminum alloy counterpart. If higher strength materials can be used and tolerances reduced, then the hot airplane could be competitive for the weight factor.

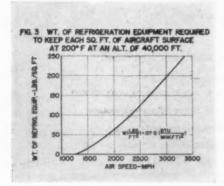


This simple problem of weight should occupy us sufficiently without considering high altitude environments, the effects of cosmic radiation, the probability of meteorite collisions and acoustical vibrations which may radically change design concepts for manned aircraft.

Let it be assumed that the heat on the surface is known, the heat transfer problems for sustained flight must be tackled to determine

for manned vehicles reaching 1200° surface temperatures?

how long it will take for the entire structure to reach a steady state temperature. After the strength of materials at temperature is determined, attempts to design a structure follow, which consider all the aspects of plastic flow, compres-



sibility, thermoelastic distortion, thermal stress and creep which all tend to increase structural weight.

The number and types of aircraft and missiles which will be operating at these temperatures within the next few years should be known. Figure 2 is an assumption based on current investigations and indicates that the big problem is going to be with fighter and interceptor types of aircraft and to this can be added, most of the missiles.

To quote the latest information, the "Air Force predicts that 35% to 40% of its force will still be manned in 15 years and the Navy estimates 60% in 10 years. Both now claim there's no end in sight to requirements for manned systems, although missions and design types will change. Future functions of manned aircraft will be primarily reconnaissance, defense, target selection. Also, even with development of later ballistic missiles with terminal guidance capability, pinpoint attack will still require manned guidance. Both services are anxious to get into serious development of missile fighters, maximum altitude high-speed interceptors and long-endurance systems.

If we are going to eliminate the heat effects on crew, payload, fuel and instruments or hold it at a reasonable figure, then we must insulate, refrigerate or otherwise control the temperature.

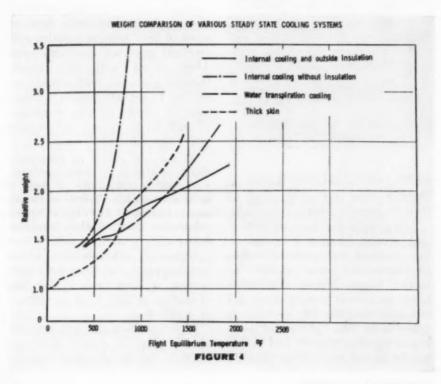
Figure 3 indicates the added weight penalty we incur for refrigeration to keep each square foot of surface at 200° F. at an altitude of 40,000 feet.

Figure 4 illustrates one estimate of the point at which additional controls for temperature will be necessary, in this case, a thick skin will serve to about 900° F.

It has been said that manned vehicles in the next few years will reach surface temperatures of 1200° F. Let us consider what is known of materials that may be used. Aluminum and magnesium will withstand temperatures up to 350° F. Sintered aluminum products which are being developed will withstand temperatures to

700° F. Of course, aluminum and magnesium, due to their capabilities as heat sinks, can withstand much higher temperatures for short times and are suitable for one-shot articles.

The use of the low alloy steels such as AISI 4340 with which most fabricators are familiar, will depend greatly upon the tempering temperature which governs the strength level. Thus their use may



range from 400° to 700° F. Martensitic steels such as AISI 422 have received a great deal of attention due to the high tensile strengths that can be attained with higher tempering temperatures increasing the useful range. The precipitation hardening steels such as 17-7 and AM 350 which obtain their strength by a relatively low temperature hardening treatment followed by aging makes them much more desirable for fabrication but the ultimate strengths must be increased by further modification to avoid the added weight penalties already discussed.

We know that the 5% chrome steels will work up to 800° F. and that the Department of Defense's program for titanium alloys is targeted for maximum of 1100° F.

We know that other martensitic alloys, like types 403 and 709, will operate to about 1100° F. and that cobalt base alloys such as S-816 and L-605 and nickel base types like inconel X and the Hastalloys can operate around 1700° F. if stresses are kept low.

Alloys consisting mainly of chromium and nickel show much promise. The 1800° F. rupture life of this type is superior to nickel base alloys, and recent developments indicate alloys better than the best cobalt alloy can be produced for this temperature.

We know that there is much basic research going into refractory metals such as zirconium, vanadium and molybdenum, but information available is too sketchy to hazard a guess as to the potential except that such products are intended for temperatures above 2000° F.

Also being considered for temperatures above 1500° F. are the cermets or combinations of metals and ceramics. The number of possible combinations is very great, and it is believed that the proper ones will produce very high melting points together with excellent strength and ductility. To date, the metal binders have been limited primarily to nickel and cobalt alloys but many others are being studied. For the ceramic portions, borides, nitrides, oxides and silicides are all under investigation. These compounds are generally extremely hard and brittle and low impact strengths remain the greatest deterrent to their use. They will probably remain as sintered, forged, and extruded products with machining held to a minimum. Their potential is mainly for hot engine parts such as blades, vanes and impellers, and very little, if any, use will be made of them for large structural members.

Composite materials are also under investigation and include steel reinforced aluminum and magnesium, copper clad steel, laminates of cermets and metals and even reinforced concrete and ceramics. Here again the emphasis is on very high temperatures.

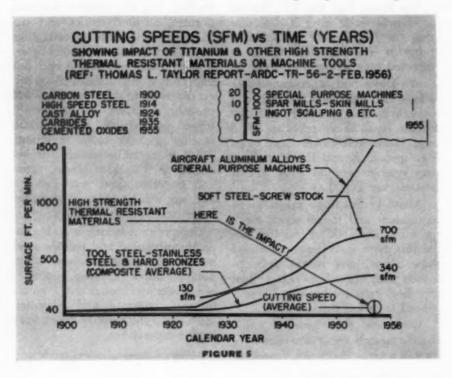
Many of these alloys corrode and

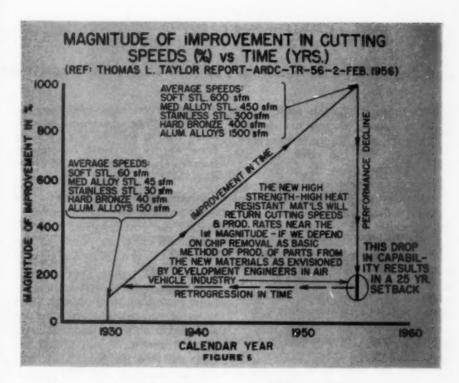
oxidize rapidly. Others have a definite limit of ductility which precludes using them in very many primary structural applications. Some, such as the cobalt base, nickel base and molybdenum base alloys, are not heat treatable except for possible aging treatments. Many, like the titanium alloys, all exhibit tendencies to gall and drag during machining and some, like the chromium base alloys, can only be ground today. One thing they all exhibit, in the hardened condi-

tion, is extreme reluctance to machining by conventional tools and techniques.

Many of these materials are now being used in jet engines, ram jets, rockets and adjacent structures and components today. Thus, there are no mysteries attached to them until application to the type of airframe components that many of you are producing is considered, namely, large and complex extrusions, forgings, plates and billets.

Assuming the present design con-





cept of large skins and fittings continues, Figure 5 pinpoints the critical problem.

Must the machining speeds as high as 15,000 sfm presently being used on aluminum be reduced to speeds as low as 65 sfm for the future production of similar high strength steel or titanium components?

If true, a simple conversion in material without changing the design concept, presents what apparently is an impossible situation if airframes are to be produced in quantity for supersonic performance. Figure 6 illustrates this impact whereby machining capabilities move backwards in time twenty-five years.

Those airframe companies which have integrated steel and titanium forgings and extrusions into their designs, are already aware of the situation. It has been stated that as high as 77% of a particular titanium forging must be reduced to chips. This accounts for the attempts being made, through the airframe industry, to initiate the necessary development to get various semi-finished products produced more nearly to the actual

With heat resistant coatings you'll be using less temperature

sizes required. At this writing, the job is moving slowly and causing grave concern. There is assurance, however, that the effort will not slacken and there are, at present, both government and industry development projects in work pointed toward these necessary goals.

If we assume for these high strength alloys, that in the immediate future no-draft forgings with thin webs and precise tolerances and thin wide profile extrusions will not be available, then one of three things must be done: provide much larger machining facilities throughout the country; design to reduce the amount of machining; or find new ways to machine.

The first premise is, of course, economically abhorrent. The second is under consideration. Honeycomb and other sandwich types of construction are not only being researched but actually used. Built up structures employing thin plates and skins of steel and titanium alloys are another possibility, while still a third is to use different types of heat resistant coatings over external surfaces. The use of insulating materials, surface layers of low conductance materials, and a whole host of other approaches are being weighed.

The current state-of-the-art for sandwich type construction indicates that it will be a very long time before current configurations can be considered producible.

Neither is the strength to weight ratio considered optimum. The weight and cost involved in building sandwich types points to the fact that this is actually a poor way to stiffen thin skin. Work in this field will continue, but let me remind you that even though such types of construction are used for skin panels on wings and fuselages, internal structures and attach fittings carrying the basic loads will still be necessary and will require machining to some degree.

Heat resistant coatings will reduce the time of heat transfer, thus allowing the use of less temperature resistant and more easily worked alloys in the internal structure.

Another consideration that we must not overlook is the fact that the aircraft industry is accumulating a wealth of knowledge on high strength alloys. We can assume that if a designer has a weight or space problem—and he always has—his acquired knowledge of high strength materials may cause him

resistant, more easily worked alloys in the internal structure

to consider them in place of the weaker and bulkier aluminum and magnesium alloys for load carrying members on all types of aircraft whether they get hot or not.

Now, to repeat, how can alloys with tensile and yield strengths well over 200,000 psi be machined into shapes essentially the same as those we are familiar with today, at very high rates, with reasonable tool life, and without impairing the strength or quality of the end product?

You have all heard of Chemmilling and the Elox and Anocut methods of removing material. The fact that they are being considered as production methods to replace conventional machining illustrates the urgent need for improvement in current methods and techniques for machining high strength materials.

While Chemmilling does have advantages in reducing the thickness of material and of producing tapers and steps, the method has certain limitations. Boring of large holes and the removal of large masses of material from complex shapes is not a job for Chemmilling. Current difficulties with the decarburized surface in products such as steel forgings and extrusions must also be eliminated be-

fore Chemmilling can be satisfactorily used on these. If machining speeds can be increased, the handling and masking costs for Chemmilling, when complex shaping is necessary, can easily be more than the machining.

Elox, Anocut, and other electrical and electrolytic methods are finding increasing use, but here again limitations for complex shapes are evident. In addition, the degree of oxidation, embrittlement, and decarburization created are not well known. Any widespread replacement of current machine tools or other conventional types of equipment by these methods for the production of large, complex aircraft parts appears rather remote. The fact to remember, however, is that there is a widespread movement away from conventional methods and techniques, and thus it behooves all interested persons to closely examine their current practices, equipment and tools, and initiate that type of research and development which will reduce excessive machining times.

Figure 7 shows the results of some work which was accomplished on the speed of cutting as far back as 1931, as well as the assumptions made on the basis of this work. Dr.

Salomon developed the theory upon which these curves are based, and his work was further substantiated, in part, by Dr. Von Karman's theory of critical velocity.

Simply put, it is indicated that beyond what has been called the "valley of death" where cutting tools fail rapidly under high rates of speed, there is a cutting velocity where this does not occur.

In the corner of the figure is indicated some of the efforts that have been made in isolated cases to improve on current practices. For some time now, Menasco Manufacturing Company has been machining hardened steel landing gear components at speeds as high as 5,000 sfm. Recently, Dr. Max Kronenberg has reported good success working with a specially designed lathe at the LeBlond Company, machining carbon steels at speeds on the order of 10,000 sfm. Other isolated cases are also reported from time to time. What is more important, however, is the

MACHINING RESEARCH

TEMPERATURE (°F) vs CUTTING SPEED (SFM) CURVES*
AS DRAWN FROM DR. C. SALOMON'S PATENT OF 1931

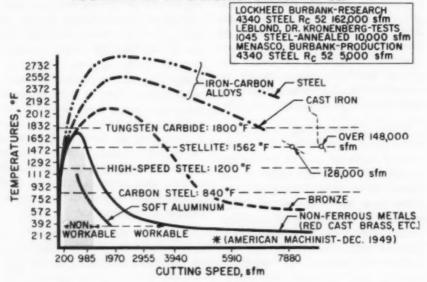


FIGURE 7



FIGURE 8

fact that the Russians have apparently far outstripped us in reducing theory to practice. Phenomenal speeds and feeds have been reported through qualified sources. Eye witnesses say that the chips they have been producing are pyrophoric and disappear in thin air, with the workpiece assuming the color of a rainbow and the tool remaining cool.

In discussing Dr. Salomon's and Dr. Von Karman's theories with Lockheed scientists and research personnel, good agreement was found that these theories are sound. although some modifications may be necessary. As a result, Lockheed initiated a series of tests intended to get some rough idea as to what happens to the workpiece and tools at very high velocities. The first problem was one of attempting to achieve the desired velocities and, having a number of gun enthusiasts at Lockheed who are constantly striving to obtain flatter trajectories with their rifle loads, it was decided to use the same techniques to supply some answers quickly and at moderate cost.

The rifle shown in Figure 8 is a 30-06 caliber Mauser, having a smooth barrel bored out to accept a .300 inch diameter slug. On the end of this barrel is mounted a tool holder. Cartridge cases were loaded with various grades and quantities of rifle powders and slugs designed to fit the cases measuring two inches in length. These slugs were AISI 4340 steel, heat treated to 280,000 psi, uts.

First firings were made across single point tools ground to a 90° included angle, and in various alloys and carbides. Initial firings were chronographed and muzzle velocities averaging 2,200 feet per second recorded. This was calculated to 132,000 sfm. A second series of tests were run with a flat nose tool, and with these the surface feet per minute was increased to 162,000.

In both series of tests, a definite

cutting action was observed without tool failure except for a carbide tip in the first test. The cuts were smooth, the second group of slugs measuring 20 micro-inches. An increase in hardness of 1 to 4 points Rc was measured in the slugs to a maximum depth of .010" below the machined surface but otherwise no effects on structure or strength were measurable. To date we have not been able to observe the resultant chip. Further, more elaborate tests are planned which will be fully instrumented so that all variables can be studied. From these tests we expect to establish critical velocities for cutting all common aircraft materials.

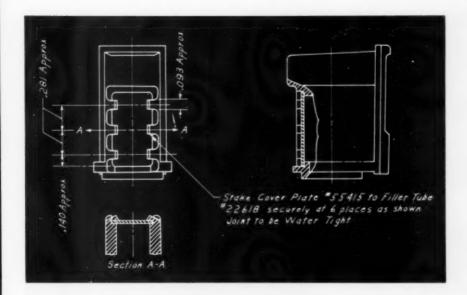
Now someone is going to say that this work is all very well but how can these theories be reduced to practice? Frankly, this is not known today. The initial effort must be to establish the validity of the theories and then the machine tool builders must design tools with the necessary velocity and rigidity to reach the target. When it is realized that the power requirements fall off in inverse proportion to speed of cutting then the idea becomes more national. It is believed that present work in dampening devices and the causes of acoustical vibrations may contribute something worthwhile. Thus, for linear and peripheral machining where access and cutter size are not limited it's a job of development.

This is not to say that pocket and contour milling of hard alloys at these speeds is feasible. The spar, beam and rib with dozens of small pockets and small fillets varying throughout the piece will constitute a serious producibility barrier.

One must have the utmost respect for the airframe designer and his wonderful ability for getting the last ounce of weight out of a structure and for chasing loads through the frame across sometimes torturous paths.

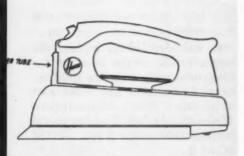
It would seem that the designer must stay with internal structures of aluminum alloys with which he is so familiar for many years to come simply because weightstrength ratios will dictate this and, what's more important, because our whole airframe economy is based on our knowledge of how to design and fabricate aluminum structures. The temperature resistant alloys need much improvement, not only from a strength, corrosion and ductility standpoint but they must be capable of being processed so as to afford the maximum fabricability.

Presented at the Third Annual Contour Machining Conference, Oct. 24, 1957. Sponsored by True Trace Corp., Los Angeles.



Cutting Costs on Filler Tube Assembly

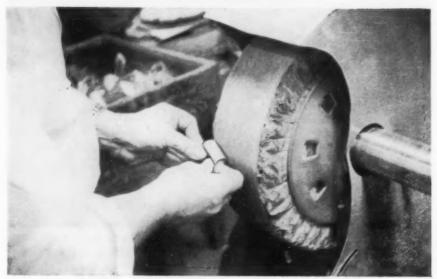
New method eliminates five operations on electric iron with annual savings of \$24,605 at Hoover Company



By **Edward T. Girard** The Hoover Company North Canton, Ohio

 Here is an improved method of processing a filler tube and filler tube assembly of an electric iron.
 The savings in man hours was brought about when the sides of the tube were milled instead of ground and when the assembly was tumble burnished.

The Old Method



Grinding and sisal buffing operation was superseded by tumble burnishing.

The filler tube for the iron, using aluminum AL 73, was formerly processed in the following manner:

- 1. Diecast.
- 2. Trim parting (tray to box air blow off).
- Broach the core flash from the bottom I.D. and %-inch hole in the bottom. Trim the parting from the bottom O.D. Bench to box.
- 4. Inspect and pack.
- 5. Broach water opening.
- 6. Drill %" dia. hole .229" deep (plus .058).
- Scrape flash from one hole and four sides of water opening.

8. Grind top and two sides.

The filler tube assembly was formerly processed as follows:

- Assemble the filler tube and filler tube cover plate and stake.
- 2. Grind and sisal buff.
- Load in baskets, degrease and unload.

It was decided to replace the bright finish on the front of the filler tube with a similar finish of barrel burnish for the entire part to provide a more economical part. The material selected was a general purpose aluminum alloy, ASTM SC-84-B.

New Method

My proposed method was to mill two sides of the filler tube which formerly was ground. After assembly to the filler tube cover plate, the parts were to be tumble burnished. This would eliminate operations 2, 6, 7 and 8 on the filler tube and operation 2 on the filler tube assembly. The sequence:

- 1. Diecast.
- 2. Mill 2 sides; file flash from top.
- 3. Broach core flash from bottom I.D. and '%" hole in bottom. Trim parting from bottom O.D. Bench to box.
- 4. Inspect and pack.
- 5. Broach water opening.

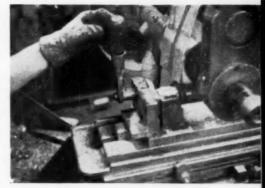
The new method for the filler tube assembly was as follows:

- 1. Assemble the filler tube and filler tube cover plate; stake.
- 2. Tumble burnish. (.035 standard hours per 100).

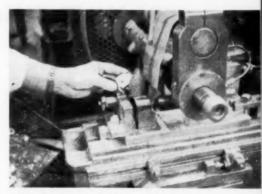
The savings on this method change for the year, based on a scheduled production of 500,000 irons, was \$24.605.

With the old method, a combined total of five operations amounted to 1.785 hours per 100 units. Taking these hours times burden and base rates, the total factory cost with this method was \$6.35 per 100 units.

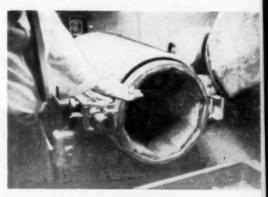
Results achieved with the new method and the two operations amounted to a cut in hours per 100 units to .330. Total factory cost amounted to \$1.405 per 100 units. Tooling cost per year was estimated at \$125.00.



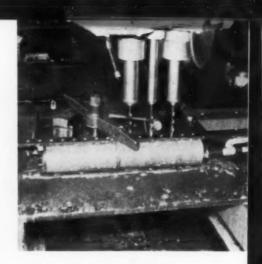
Filler tube in fixture for milling operation.



After milling top flash is filed.



Barrel used for burnishing operation.



Here's a cost cutting set-up for . . .

Multi-Drilling of Pipe

By Clement F. Brown, M. E.

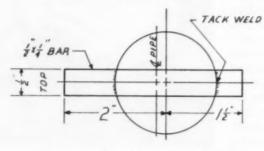
 Here's a low-cost drill jig and set-up for producing a series of holes in pipe or tubing that will prove a real timesaver for fabricators of this type of cylindrical component.

Jobbing lots of 3" diameter pipe with two rows of 3/8" diameter holes present a typical problem.

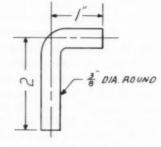
Pipes were of two lengths—24" and 19". Holes were to be drilled in parallel lines 60 degrees apart—the longer pipe with seventeen holes on 1-5/16" centers in each row. These particular parts were used for sparger or sprinkler pipes.

Because of the nature of the parts, an unmachined drill jig (shown in the accompanying drawing) proved adequate.

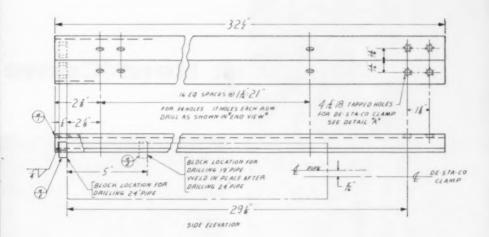
The jig body was a piece of flat steel bar, bent down its longitudinal center to an included angle of 120 degrees. Stop blocks were tack welded to one end. Two rows of 3/8" diameter drill guide holes (at the required number and center distances) were drilled in the jig body. Jig was clamped on the pipe with a toggle clamp bolted to the end of the jig body. A flat bar tack welded to the toggle clamp's end provided a



DE-STA-CO CLAMP PAD



DETAIL OF BENT PIN

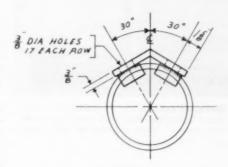


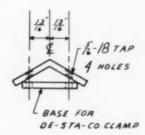
clamping bridge to the pipe's walls. A drop pin was used to place in the first hole drilled in the pipe to prevent any slippage of the jig. After the longer pipes were drilled, another stop was tacked in place on the jig's body to accommodate the shorter pipe.

The mounted drill jig and the drilling set-up used are shown in the photograph.

Jig and part were clamped to the table for the drilling of the first row of holes. Then clamp was loosened, the pipe rotated 60 degrees and re-clamped. The pipe was aligned and rotated against a flat guide bar clamped to the table (not visible in the photo). The work was done on a radial drill press. The use of a 3-spindle drill head further increased the efficiency of the operation.

While this low-cost jig served this particular purpose well, close toleranced hole size or spacing and large production runs are factors that call for added tooling expense. Hardened tool steel jig bodies or the use of drill bushings would then merit the tool engineer's consideration.

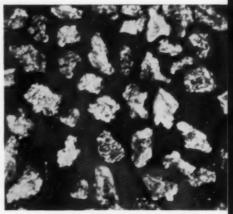




DETAIL "A"

Machines used in the production of manmade industrial diamonds must withstand tremendous "super" pressures and temperatures.

Here Come



Under a microscope, man-made industrial diamonds of various shapes and colors possess real beauty.

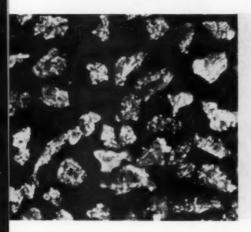
The General Electric Co. has been able to bridge the gap from the research phase to pilot-plant production of diamonds in slightly more than two years. For the past several months various companies have been evaluating these diamonds in the field. Only a few key persons in those plants have known that General Electric diamonds were in use, because G.E. wanted to get an unbiased evaluation of them.

The Metallurgical Products De-

partment has produced well over 100,000 carats in a very short space of time, and this was accomplished in the pilot-plant stage. There are still improved processes to be found for making the diamonds and possibly larger sizes to be produced for industrial use, General Manager Kenneth R. Beardslee announced recently.

Virtually all industrial diamonds have been coming to the United States and every other country of the world from the Belgian Congo

Man Made Diamonds



- 100,000 carats produced by G.E.
- Equal to natural diamonds in every respect, tests disclose
- Cost: 40% above natural diamonds
- G.E. will make half of U. S. requirements in 1958

A close look at the finished product is made by John D. Kennedy, manager of the diamond section of Metallurgical Products Department of General Electric.



New pressure-temperature frontier: 2,400,000 psi, 5,000° F.



Kenneth R. Beardslee, general manager of the Metallurgical Products Dept. of General Electric Co., directs the industrial diamonds project.



These diamonds, valued at about \$30,000, will go into grinding wheels which will be used to sharpen carbide cutting tools.

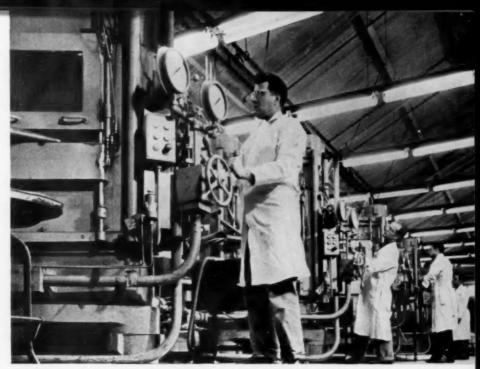
and South Africa. A syndicate, composed of British, Belgian and South African firms, mine and market 95 per cent of the world's natural diamonds. Each year approximately 7 million carats of imported natural industrial diamonds have been used by American industry for grinding and lapping operations. It is estimated by G.E. that there are enough applications in our metalworking industry to use 10 million carats of industrial diamonds annually. Pricewise, natural diamonds are selling today at \$2.85 a carat; G.E.'s price today is \$4.25 a carat. This price, of course, will get more

in line with the syndicate price as facilities are expanded.

In making their industrial evaluation, G.E. approached those applications which offered the greatest immediate potential for the type of material they produce: in the area of resinoid and vitrified bonded diamond grinding wheels for the finishing of cemented tungsten carbide tools.

They made every effort to use natural diamonds as a basis for comparison.

The next step was to experiment with grinding wheels. Since G.E. uses both resinoid and vitrified



Engineers regulate the machines in the diamond section at General Electric's Metallurgical Products Department in Detroit.

bonded wheels they began with this type of product. Their approach was to use both a natural and a man-made diamond wheel at the same time on the same machine under carefully controlled manufacturing conditions. Each of these wheels was tested first in the laboratory and then in actual manufacturing operations. Experiments have been carried out in the areas of lapping compounds, the finishing of natural diamond wire dies and dental tools. Results were very favorable.

Yet to be completely investigated is the use of these diamonds in

the metal bonded type wheel. This being the smallest total immediate potential today, the work has not carried a high priority. That phase is under investigation now, although it is too early to predict what the results will be. These results, of course, will have considerable bearing on G.E.'s future approach to the total diamond business.

G.E.'s crystal sizes are not large enough for all industrial diamond applications. It may be necessary to modify the crystal to satisfy specialized types of applications yet to be tested.

WELDING vs MELTING

Some down-to-earth observations and hints on nomenclature

By R. G. LeTourneau, President, R. G. LeTourneau, Inc.

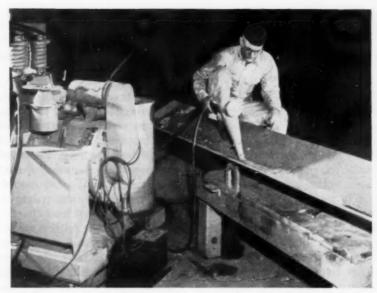
Similar to a squirt welder, the Tourna-melting machine uses a large tube to conduct the wire and a large can to hold the flux. Completely a free hand job, the operator drags the can along at the right speed and the machine does the work. As for speed, it doesn't matter so much if you move it a quarter or half-inch at a time as long as travel time is one or two feet a minute.

 I shall not try to give a research history on the art of welding. But to illustrate what I am driving at, I will give just a little history only as far back as my personal observation goes.

I was named after a village blacksmith. He and my father were very close friends, and they gave me both of his names, Robert Gilmour. He was typical of Longfellow's famous poem:

Under a spreading chestnut tree The village smithy stands; The smith, a mighty man is he, With large and sinewy hands.

Only he and his partner, who was my uncle, operated a regular shop for fixing wagons, shoeing horses, etc. As a boy, between the



Tourna-melting-it's like squirt welding but with bigger conductor, wire and teapot.

ages of 10 and 14, I used to play in this shop and watch them shoe the horses, or see Uncle Robert put two irons in the fire, get them just the right temperature so that they were a white sticky mass, lay them across the anvil, hammer them together and they became one solid piece. Of course, they were beveled to fit together before heating. This operation was called welding.

Nowadays, we have many different ways of uniting metals and the word welding is pretty much used to describe them all. But it seems to me we could well afford to enlarge our vocabulary and use some more descriptive words so as to have a better understanding of

what we are talking about.

When I was 14 years old I went to work in a foundry where we made cast iron castings and served my time as an apprentice iron moulder for four years. They used to say cast iron cannot be welded. I agree that welding would be the wrong word to use, but we often united two pieces of cast iron by simply melting them together.

We arranged a mould so that a stream of white hot molten iron would pass between the two pieces, and when the ends of each piece began to melt we just stopped the overflow stream, let the mould fill and you had both pieces made into one solid piece. I would say the proper name for uniting these two

To make full strength welds uniting 21/4" plate in one pass:

pieces would be melting them together rather than welding. After finishing my apprenticeship at the age of 18, I worked for awhile as a journeyman iron moulder in the Judson Iron Works at Oakland, California. It used to fascinate me to watch the rolling mill make bars of various sizes and shapes. They took the scrap steel and sheared it into pieces four or five feet long and hand fit the pieces into a pretty compact bundle two or three feet in diameter, tying the bundle together by wrapping small bars around it, then, heated the bundle in a furnace to a welding temperature, and then rolled this bundle into a solid mass and kept right on rolling until it came out in a small bar such as used for concrete reinforcing steel, etc. Here again is a process I would call welding because these bars were simply stuck together. What I'm leading up to is to make a distinction between welding and melting.

During that same year I worked at Judson Iron Works, there came a slack period and I, having the less seniority, was laid off for awhile. Not wanting to be idle, I took a job as helper in the nearby Yerba Buna Power Plant. They were overhauling huge storage batteries which balanced the load for the

whole transit system of the East Bay Region. One of the trick jobs was to weld the battery plates to the bus bars. It was known as the art of lead burning. These artisans were called burners instead of welders. Actually, a mould was placed around the parts to be united and the lead parts were melted together with a torch using hydrogen gas and compressed air. You will be shocked to know that the commercial hydrogen gas in those days was made by dissolving zinc in sulfuric acid. Anyhow, the Burner that I worked for was a good Joe and I tried to do him an especially good job, so he let me try my hand at burning now and then. I might say generally it took him longer to patch up my mess, but one day he was gone and I was alone in the battery room. I said to myself, "It's time I quit trying and did a real job." The plates were ready for burning and I applied myself to the task with such determination that I just didn't know what was going on around me, and I made a perfect scald too. When I looked up, the big boy was standing behind me watching what I was doing. All he said was, "I'll get you a torch. You are a lead burner instead of a helper." Incidentally, this is how I became one

wobble back and forth slowly

of the first to hang out my shingle as an oxyacetylene welder after I had become a garage mechanic some years later in Stockton, California. They told me in Stockton that there was a shop in San Francisco that had a torch using acetylene and oxygen that could weld most anything together. I immediately got in my car, went to San Francisco, found the shop, bought a used torch with the understanding I would get three days' training on how to go about it with the different metals, then came home and hung out my shingle.

Lead was really harder to handle than cast iron, brass or steel, but aluminum was the trickiest of them all.

For our nomenclature lesson, let's call the above a welding process, because the metals are kept in a more or less plastic state while being united, but are not allowed to run like water except the lead burning. It actually becomes very liquid and will leak through a very small hole if you are not careful, so I say instead of burning, it should be called melting.

On the first large earthmoving machines and bulldozers I built after quitting the welding shop and garage business, which was right after World War I, the main frames



Bigger teapot holds more flux. Operator turns on more juice and does the job four times faster or makes four times as heavy a weld at the same speed.

were oxyacetylene welded throughout and they all said I was just crazy on welding. I was the designer, welder and operator too. Then electric welding came with the bare rod. Then came electric welding with the heavily coated rod, also fusion welding and spot welding. In both of the latter the metal is heated by the resistance of the current instead of an arc. Then came the completely submerged electric arc welding which had to be done by a machine which used a much higher power than heretofore because around the arc a stream of granulated slag completely sealed off the air from the molten metal. This arc is hot enough to melt both surfaces of the metals being joined while a heavy wire which is the electrode is continuously fed into the arc, and the molten pool of metal so that actu-

You can make as high as a 3/8" weld at 3 feet a minute

ally two steel plates, say an inch and a quarter thick, can be completely melted together in one pass of the machine. The only difficulty with this type of, I would say, melting, is that the work has to be practically flat and level and set up in a machine that can follow the joint at a given rate of speed with a given amount of electricity, and metal being added with the wire electrode feeding in at a given speed. One trade name for this type of welding is union-melt. I would say melting is a good word for this because there is a large molten pool of metal.

Then came the squirt welding process. With this method you use a much smaller feed wire or electrode and much less current, but having the steel and wire electrode fed through the middle of a flexible insulated copper conductor with a sort of a teapot on the end so a man can carry and feed the granulated flux and start welding anywhere within the length of the cord without wasting so much time getting the work lined up in a machine. This type of welding is kind of in between, but the molten pool is so small perhaps we had better call is welding.

A few months ago I asked the

question-why can't we take that squirt welder and increase the size of the flexible copper conductor and make the wire four times as big, make the teapot on the end a little bigger to hold more flux, and turn on about four times as much juice so the man can do the job four times as fast with either four times as much footage or four times as heavy a weld at the same speed. You will note, I'm still using the word weld but this is really melting and we are doing it. The Vicksburg Plant's Chief Welder called up and said, "Can't you send me three of the new machines?" I said, "Yes," but only sent one for them to try first. The next day I was over there and asked him if he still wanted the other two machines, and he said, "Goodness, no. We used to cut four times as fast as we could weld, but that machine welds four times as fast as we can cut. One is enough."

I won't go into a lot of detail of what I had to do, but I put the whole works in a little aluminum box you could stick in the back of your automobile, then just for fun I hooked it onto the generator that drives the wheels on my tractors and started Tourna-melting steel together like nobody's business.

Safety comes first when . . .

Air Valving a Press Clutch or Brake

By Andrew B. Huntington* Chief Engineer Ross Operating Valve Co.

• Reduction in the frequency and severity of industrial accidents is of prime importance to everyone. Power presses, because of their function, present some major industrial accident hazards. The most disastrous of these hazards can be accidental press stroking, often referred to as a "press-repeat."

The application of mass production principles in the metal-working industry has brought about the development of fast-acting pneumatic clutches and brakes for all types of power presses. In the usual device of this type, the clutch is air engaged, spring dis-engaged; the brake is spring engaged, air dis-engaged. This provides a very desirable fail-safe type of arrangement in the event of loss of primary air pressure.

To control the air power, which *Presented at the 45th National Safety Congress and Exposition. can dis-engage the brake and engage the clutch, a solenoid operated, 3-way, air valve is usually used. This is a 3-ported valve, having an inlet, an outlet and an exhaust connection.

In a direct solenoid operated valve, an unsafe valve condition can be caused by a freezing of the solenoid in the energized position, a return spring or linkage failure or some internal mechanical interference. In the more usual solenoid actuated, pilot operated valve, mechanical failure in the pilot section is an additional possibility.

To overcome the principal lack of safety in what we may call the simple "Series" method, one press manufacturer has used two valves in series, each modified to include a valve-parts-position indication stem, in combination with limit switches (Fig. 1). With this added and highly desirable feature, the individual valve actions can be electrically indicated and interlocked. Adequacy of the improved

safety here depends primarily on the ability of the electrical circuit to prevent further press cycling whenever one of the limit switches indicates something is wrong.

A second and more complicated variation of the series method is a multiple, or dual unit valve. This item consists of a 3-way, normally open, so-called "safety-unit," a 3-way, normally closed, so-called "operating unit," a safety verifier, a permissive pilot and various interconnecting passages. The safety unit is ahead, or upstream, of the operating unit (a series type connection) and the pilot solenoids

are in parallel electrically. The safety unit is a stand-by type and has a feed-back operated lock-out feature. In the event that pressure remains momentarily on the brake-clutch in absence of the proper electrical signal, line pressure should trip the "safety" or stand-by unit and dump the brake-clutch. Re-setting or re-cocking of this valve can be done after removing the inlet pressure on the "safety-unit."

A second simple method of controlling clutch action consists of using two 3-way, normally closed, solenoid valves, in parallel both

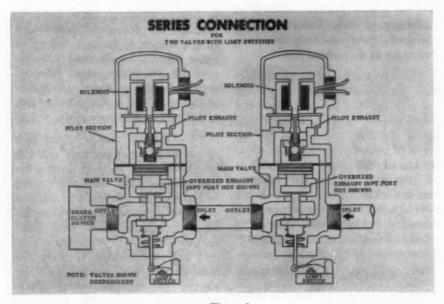


Figure 1



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pneumatically and electrically. With this "parallel" arrangement, a hazardous condition exists whenever either of the two valves malfunctions and remains open in the absence of the proper electrical sig-

LIFEGUARD VALVE PILOT SUPPLY EXPLAUST PILOT BOLENOID NOTE: VALVE SHOWN DEENERGIZED

Figure 2

nal. This condition can be somewhat alleviated by providing each valve with an over-sized exhaust.

The Ross Lifeguard valve represents another, and-of course-we believe the best, dual-valve of the same parallel type (Fig. 2). It consists of two identical 3-way, normally closed units each with its own pilot section and solenoid, in paral- same general reasons, much inter-

lel both pneumatically and electrically. The units have a common %" inlet port, a common 1" outlet port and two 1" interconnected exhaust ports, the last providing the desirable safety feature of an exhausting orifice considerably larger than the pressurizing orifice.

The two 3-way normally closed pilot sections are symmetrically supplied through a sensing unit which will cut off the pilot air supply in the event that the two valve units do not open or close together. This sensing unit is a pressure operated spool valve. One end of this spool valve is internally connected to the outlet chamber of one valve unit and the other spool end is connected in a similar manner to the outlet chamber of the other unit.

Even at an operating rate of more than 300 cycles per minute, failure, or sluggish opening or closing of either half of the main valve, due to foreign matter, a broken part, a malfunctioning pilot section or solenoid, will result in a pressure unbalance on the ends of the spool. This will cause the sensing spool to shift, cut off further pilot air supply and mechanically lock-out. Removal of pilot air pressure makes certain that the main dual-valve units cannot thereafter be operated to cause a press-repeat.

At the same time, and for the



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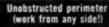
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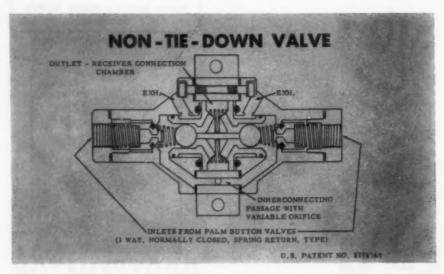


Figure 3

est has recently been shown in a different approach to safer press control—namely, all-air control circuits. These circuits can be developed to include such features as two-hand or two-station control, emergency stop, top stop, continuous cycling, inching or jogging, single stroking and guard device inter-locking.

Two valves that can be used in all-air control circuits have special safety characteristics. The first is part of an air circuit element controlling the starting of a press cycle. This valve, shown in Fig. 3, is used where it is necessary—for safety—to make sure that the press operator uses both hands nearly simultane-

ously to initiate each press cycle.

Looking at the illustration, it can be seen that the right and left hand halves of the valve are identical, each half having its own inlet, and the single outlet, or receiver connection being in the exact middle of the valve. A 3-way, normally closed, palm button pilot valve is used to supply each non-tie-down inlet. If the flow through the nontie-down valve from each pilot valve is not balanced, one of the non-tie-down valve pistons will shift and vent any outlet pressure to exhaust. This makes certain that the press operator uses both hands simultaneously to initiate a cycle.

If the operator engages only one

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of the hand valves, after a very short delay, the non-tie-down valve will automatically prevent downstream pressure build-up until that hand valve is released and both hand valves are tripped in unison. Release of either one of the hand valves will cause the non-tie-down valve to dump any downstream pressure. Similar to the Ross Lifeguard valve, the non-tie-down valve has built-in "fail-safe" features.

Downstream of the press-starting air circuit element, a second safety valve can be used. It is shown in Fig. 4, and is called a single-stroke valve. This valve can follow the non-tie-down valve or it can be supplied directly from one or more

3-way, normally closed, pressstarting pilot valves. The singlestroke valve first allows a receiver or clutch valve pilot line to be pressurized and then automatically closes, remaining in this safe, closed, position until the manual start valve, or valves, are released.

Safetywise, the valve can therefore be used to force the machine operator to maintain the manual start valves open until a cam type, top-stop valve is opened by rotation of the press shaft. Initiation of a succeeding press cycle can only be accomplished after the single-stroke unit has been re-set by exhausting its inlet pressure back through the 3-way manual start valves. • •

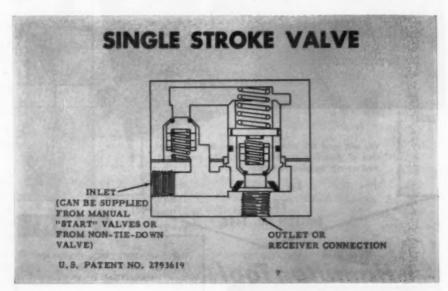


Figure 4

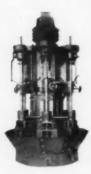


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bores diesel engine cylinder blocks — automatically

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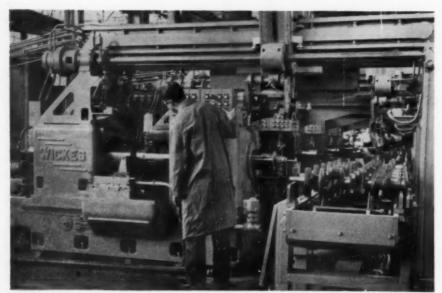
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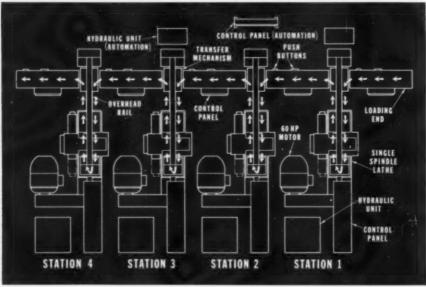
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Loading device transferring a crankshaft to No. 1 station. No crankshafts go through this point without first passing through chucks of the machine.

Layout of new Wickes automatic in-line 4-stand transfer machine for turning forged steel crankshaft pins at 250 fpm with carbide cutting tools.



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Machining Crankpins on a Transfer Line



Machine speeds upped from 60 sfpm to over 250 sfpm

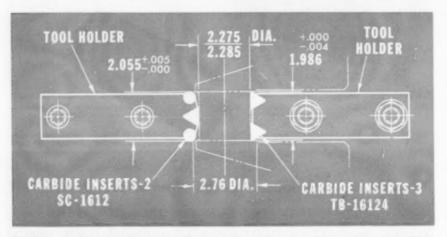
• A new approach developed by Wickes Corporation for machining forged steel crankshaft pins consists of splicing together in a line, a series of simple single-purpose lathes. Each of these is fed by a common, automated line parallel with the in-line lathes—for progressively machining the No. 1, 2, 3 and 4 pin diameters of a forged steel, 4-throw crankshaft of a typical V-8 automotive engine.

The concept provides for 5-minute tool changes per lathe, the use of standard insert carbide cutting tools, the machining of only one crank pin at each station, continued production of other machines, while one is down for tool changes, and continuous automation to feed work to these machines during the period.

Under the automated concept developed by Wickes engineers, machine speeds are stepped up from 60 fpm to over 250 fpm. This means the use of cemented carbide cutting tools for the first time—not in the low, but in the medium to high speed cutting range. It also means an hourly production of each 4-station, in-line setup of 50 crankshafts per hour.

Retooling such an automated line is simply a matter of changing tools to meet specifications, since chucking remains the same, and standard carbide inserts are involved. is powered by a 60-horsepower direct current variable speed motor. In other words, each unit has a three-to-one speed range for cheeking or facing, and plunge-forming diameters of the crankpins.

Each machine cycle in the line is automatic. During a typical run, crankshafts are first loaded on the first section of the automatic con-



Location of standard triangular and round-shaped insert carbide cutting tools. Note, tools approach work both from front and back to cheek and turn the pin diameter in one operation.

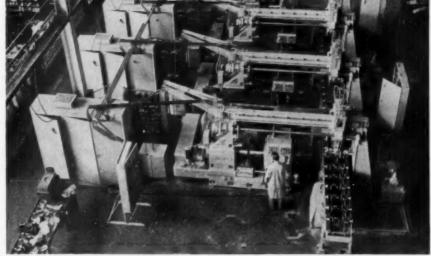
Manpower needs are cut in half. On three 4-station lines only 3 men are required instead of 6.

Since retooling is so greatly simplified and machine operations so flexible, there is nothing to prevent the line from being used to process crankshafts of several automotive engines.

Each station spindle in the line

veyor. As the shafts are placed on the line, they are automatically transferred up to the spindle of the first machine, until that section of the line is loaded.

When a crankshaft arrives opposite the first spindle of the No. 1 lathe, a cross slide, traveling at right angles to the automated conveyor, picks up the shaft, reverses, and



Over-all view of automatic, transfer machine developed by Wickes Machine Tool Division. Automatic loading line is at right, power and control panels for the total horsepower (240) are at left.

carries the work about 5 feet, placing it in the open chucks of the machine. The lathe automatically clamps the work, and brings the cutting tools into action.

Less than a minute later, the No. 1 pin of the shaft is completed and a second overhead slide goes into action. This unit picks up the shaft as the chucks open up, and carries the work back to the automatic in-line transfer device which then carries the shaft to the next lathe station.

The movements to the next three stations are identical, except a different pin is machined. The chucking in each succeeding station is also different to compensate for the position of the pin involved.

Every station of the automated line can be operated either automatically, manually or independently to provide flexibility in tool changing or production. The work cycle of each station is set so each time a crankshaft is completed, another takes its place. The total capacity of the automated transfer line is 32 crankshafts, eight between each station.

In case of a tool change on one of the stations, the automated line is set so the instant a crankshaft is released from a restarted station, it automatically transfers the crankshaft up to the closest slot nearest the next spindle. The automatic conveyor keeps repeating this process until the whole line between stations is loaded to capacity. This eliminates any gaps on the transfer line, or the necessity of a lathe idling for lack of work.

Each machine in the line is a

MACHINING CRANKPINS continued

double-end drive unit. Feeds are controlled by opposed cross slides for straight plunging or in-feed. The slides also are activated hydraulically by means of a cylinder through a cam bar. An interesting feature here is that the cam bar actuates the slides through shoes, rather than a roller, to both absorb the thrust of the cutting tool, and to provide more rigidity. Like the cross slides, the chucks are also controlled hydraulically.

The carbide cutting tools in each station approach the work both from the front and the rear. As shown in an accompanying drawing, two round cutting tools are used in the front for the cheeking operation, and a triangular-shaped tool for plunge forming. The two triangular cutting tools in the back assist in plunge forming. The round cutting tools are held in a slightly tipped angle to provide a negative rake, while the triangular tools approach the work with a zero or slightly positive rake.

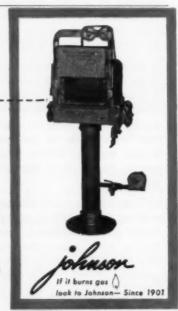
The feed for plunge forming is held to about 0.010-inch across the 2-inch width of the cut. Tools for cheeking, which involves an interrupted cut, are held to feeds of 0.040 to 0.060-inch. The depths of cuts average about 4-inch at speeds of 250 fpm.

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PROGRESS REPORT SOLID CARBIDE TOOLS

CASE HISTORY #17 CONTROL MANUFACTURER



DRILL

.125" diameter

OPERATION

Removing fin burs left by compacting

Plastic resistors MATERIAL

SPEED - FEED 16,000 r.p.m.

PRODUCTION 3 weeks per Solid Carbide tool. Only one day for H.S.S. drill.

MIDWEST CASE HISTORY #22



Series 1540

OPERATION MATERIAL

Routing an assembly. Fiberglas & hard aluminum SPEED - FEED 20,000 r.p.m., hand feed

PRODUCTION Solid Carbide production 100 times

that of H.S.S. tools.

CASE HISTORY #35 LARGE MACHINE TOOL MANUFACTURER



A-23 BUR

Fine Diamond Cut **OPERATION**

MATERIAL

Interrupted I.D. Grinding Stock removal

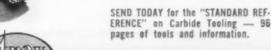
.006"

H.S.S. Rockwell C62-64

SPEED - FEED 31,000 r.p.m.

PRODUCTION Solid Carbide Bur produced 500 piece

parts per sharpening.

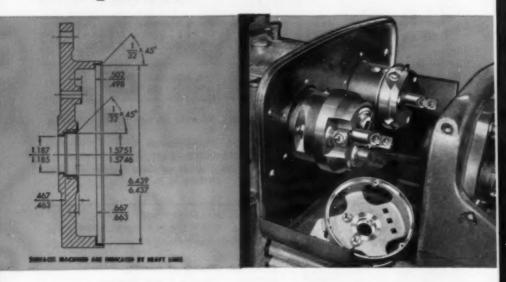




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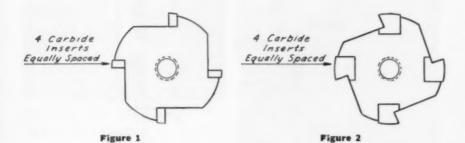


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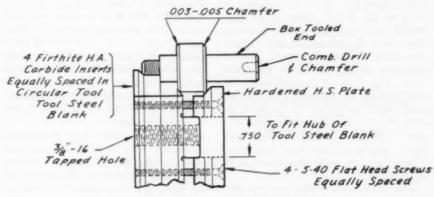


Circular Form Tools with Carbide Inserts

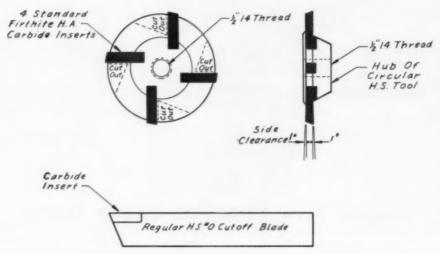
By Henry J. Bissonette

• Fig. 1 depicts the way most carbide inserts are set on tool blanks. Many times they are knocked off or chipped. I have used the method below as shown in sketch with fine results.

The way I silver solder all my carbide inserts is shown in Fig. 2. I call it a locked in insert. The tool is milled out, insert set in, leaving about 1/64" all around for silver solder to flow in, causing no strain on the carbide. This



3. Two-piece circular form tool.



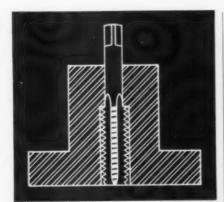
4. Conventional hardened high speed cutoff tool.

holds the carbide insert three ways, as shown in sketch.

Most of the carbide tools are made with carbide inserts straight across the entire width of tool. With tools coming in from the turret, many times they would hit the carbide inserts breaking them off and making the tool useless. All screw machine products require chamfers or slight breaks, no sharp edges. Fig. 3 shows how to overcome this breakage by applying a H.S. hardened plate protecting the carbide inserts. When tool is circular ground and plate in place, it is then opened up at the 4 carbide sections then sharpened. I have found by using this idea it saves tool costs.

The circular tool above has four sections ground out, well into the hub of tool. The carbide inserts are placed into these sections leaving about 1/64" all around for silver solder to flow in well, especially at the hub section. This is easily done by laying the tool flat on a fire brick. When all sections are well soldered the tool can be opened up at their proper places. The tool is then ground and relieved with 1° side clearance. This tool with four carbide inserts backed well into the hub, has proven tops with our cutoff problems. This applies to No. 00, No. 0 and No. 2, circular cutoff tools.

The regular H.S. No. 0 cutoff blade as shown with carbide tip or insert proved unsatifactory; due to vibration and chatter the insert would chip or fall off. These tips were replaced constantly making it costly.



Device for Starting Taps Correctly

By Federico Strasser

• In order to obtain correctly threaded holes, the tap axis must coincide perfectly with the hole axis. In other words, the tap must be at any moment at right angle to the workpiece surface. This condition may be easily fulfilled by a simple jig which is quickly machined.

It is turned from cold-rolled steel in such way that the holes should be perfectly at right angle to the bottom surface.

An important feature of the device is the fact that the hole has two diameters. The bottom portion is a sliding fit to the OD of the cutting part of the tap and the top portion is a sliding fit to the reduced, no-cutting part of the tap.

Of course, the height of the tool must be less than the length of the tap, in order that the tap-driver should be able to drive the tap into the hole a sufficient way so that there should be enough guide for further straight tapping without the jig. After this is reached, the jig is taken away and the tapping operation is continued regularly.

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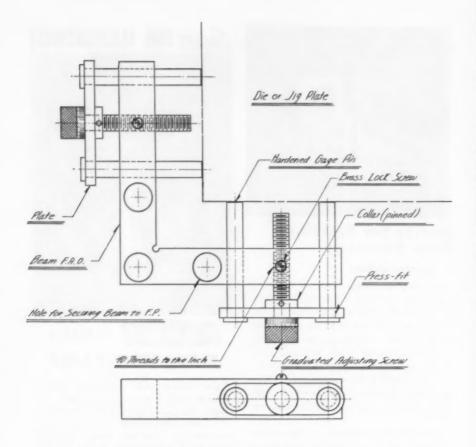
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Hole Locating Fixture

By Frank L. Rush

 The fixture here illustrated has been found useful for accurately positioning work such as, dies, jig plates, etc., for boring or reaming on the faceplate of the lathe.

The fixture consists of the following: The Beam which is accurately controlled as to squareness between the two legs, and which is ground all over. Accurate holes are drilled and reamed to receive the Hardened Gage Pins, which are held in place by use of a Graduated Adjusting Screw, and a Flat Plate. A Brass Lock Screw is provided to lock the Gage Pins in set position.

Operation of the **Fixture** is as follows: The fixture is clamped rigidly in place on the lathe faceplate by means of Tbolts which pass through the hole in the **Beam.** The work is then positioned between the legs of the beam (the work being previously ground true on its outside edges to 90 deg.). The hole to be bored or reamed is then centered by adjusting the Graduated Adjusting Screws and locking same in set position by use of the Brass Locking Screws. The work is then clamped on to the face of the lathe faceplate and the hole is machined, mounting a suitable counter-

weight on the opposite side of the work and Fixture.

The other holes that are to be machined in the work can be centered accurately for machining by simply loosening the clamp which holds the work to the faceplate, adjusting the adjusting screws, locking same, and clamping the work to the faceplate of the lathe.

TIME-SAVING BROACHES OFF-THE-SHELF

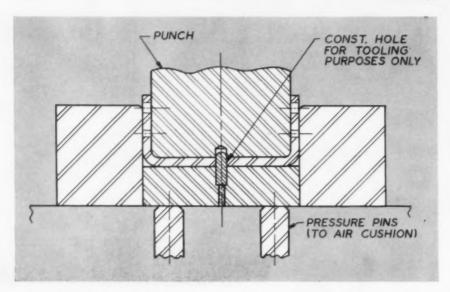
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Construction Holes Aid Shop

By Roger Isetts

• Engineers who design U brackets and other formed parts, sometimes lose sight of the problems encountered in the manufacture of these items. If the bracket is of heavy gage stock, forming problems are that much more difficult. It will help the manufacturing section considerably if a construction hole is added directly in the center of the part. Usually there is no objection to such a hole, and if there are other holes in the piece this construction hole can be placed in the part without additional cost at the same time

as the other holes in the pierce and cut off die.

Illustrated is a conventional design of a forming die for such a bracket. It can readily be seen the practical advantages of such a hole for locating the part quickly and accurately, and preventing slipping while forming is taking place.

While most designers are familiar with this problem, in the rush of a busy day the hole is sometimes torgotten about. But if the hole is on the engineering drawing before it is released to the shop, it will save considerable time and effort of the shop man contacting the engineer or draftsman, finding out if such a hole is permissible, and then getting the tracing changed and new prints issued to the various departments.



HOW WOULD YOU PROCESS THIS TANDEM BORE JOB?



Diameter range of standard honing tools: 1/8" to 2 1/8"

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The piece requires a .0002" hole tolerance plus perfect alignment, roundness and straightness of both holes.

The best process for this tough job was Sunnen Honing. The Sunnen Honing tool hones both holes simultaneously... the workpiece is self-aligning on the tool. The one honing operation guarantees alignment, identical size and controlled surface finish in both holes.

Sunnen Honing eliminates the problems you have in machining tandem bores by other methods: clamping distortion; jump and chatter of long quills or boring bars; turntable alignment error; inconsistent finish produced by dull tools.

Sunnen Honing easily holds tolerances to .0001"... requires no fixtures and assures low cost per part. Average honing machine installation with tooling is around \$1,000.

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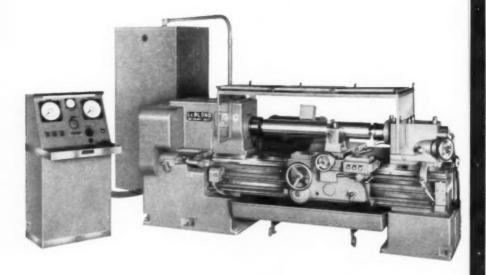


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This 150 H. P. LeBlond lathe



Special LeBlond 20" uses 150 hp motor, provides infinite speeds from 250 to 5000 rpm, 90 feeds from .002 to .136. Special bearings in head and tailstock are cooled and lubricated by pressurized oil circulating system; common oil reservoir is temperature controlled by a thermostatic

heat exchanger. Remote-control station includes: motorgenerator start and stop, spindle start and stop, length and cross feed engage and disengage, horsepower meter, spindle speed indicator, cutting speed indicator, spindle speed control, overload lights and timer. To test new cutting media and tools to their limits, General Electric's Metallurgical Products Department (manufacturers of Carboloy eemented carbides) required a faster, more powerful lathe than any available. This high speed LeBlond 20° lathe was developed for this purpose. It will rev up to 5,000 r.p.m., make efficient use of its 150 h.p. and permit a 50% overload for short periods.

LeBlond lathes are noted for their inherent stamina and rigidity. In this case it was only necessary to make modifications in the headstock, tailstock spindle and controls—the rest of LeBlond's Heavy Duty 20" was already powerful enough to take the new high loads,

Just what will this lathe do? The following test data tell the story:

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TEST DATA

* 113.6 miles per hour! Test 1

Workpiece diameter, 7.65". 5000 rpm 10,000 sfm .010 feed. Carriage travel, 50" per minute over entite workpiece .110 depth of cut. 138 hp consumed

WORKPIECE-SAE 1045, 180 Brinell, 48" long.

TOOL-CEMENTED OXIDE 0 - 30.

Test 2

Workpiece diameter, 6.65". 4300 rpm 7500 sfm .010 feed. Carriage travel, 43" per minute over entire workpiece .110 depth of cut. 105 hp consumed

Test 3

Workpiece diameter, 6". 5000 rpm 7800 sfm .015 feed. Carriage travel, 75" per minute .100 depth of cut. 148 hp consumed

Perhaps you've been looking for a lathe with this kind of power and speed. Maybe you have another special turning problem with which LeBlond could help. Or you simply need a good dependable engine lathe. In any case, you can call on LeBlond with confidence. See your nearby LeBlond Distributor or write—

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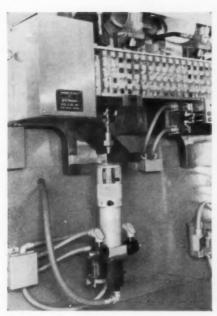
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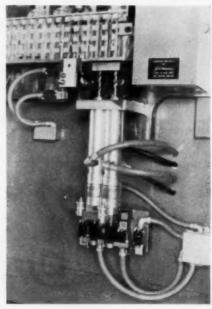
160-D

MACHINE and TOOL BLUE BOOK

Field Reports of Equipment in Action



Drill unit No. 2. It is located at lower left corner of machine (see photo next page).



Drill unit No. 3 and 4. Located at lower right corner of machine (see photo).

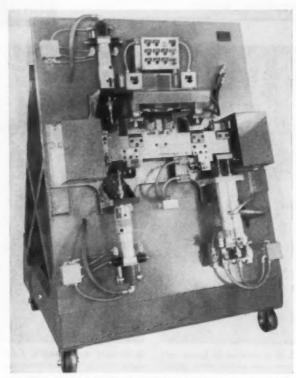
Automatic Drilling of Die Cast Grilles

FORT WAYNE—Designed and built by J. C. Thompson Tool and Die, Inc., Fort Wayne, Indiana, for an automotive parts division, new machines drill and countersink six holes in right and left hand die cast radiator grilles.

Due to the required close spacing of two sets of holes and with large drill unit housing needed, indexing of the grille workpiece is necessary. The remaining two holes are spaced differently and are serviced by individual drill units.

Automatic production sequence proceeds as follows:

- Operator places grille into holding fixture which is secured to indexing slide.
- 2. Operator presses two series-connected Cycle Start buttons simul-



Position of drill units of machine: Unit No. 1, upper left corner; unit No. 2, lower left corner; unit No. 3, left unit of pair at lower right; drill unit No. 4, right unit of pair at lower right.

taneously. This energizes the circuit that closes four air-operated clamps to hold the grille firmly in position.

After clamping, a limit switch closes causing a double-acting air cylinder to index slide and grille into the first work position.

 After indexing, a limit switch closes, signalling drill-units No. 1, No. 2 and No. 3 to advance and drill-countersink holes; then to automatically retract when the work is completed.

 After retraction of drill units No. 1, No. 2 and No. 3, series-connected limit switches close a circuit causing the slide to index back to the original start position.

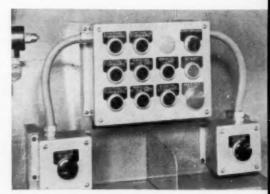
 Return of the slide to start position energizes a circuit advancing drillunits No. 1, No. 2 and No. 4 to drill-countersink holes at this setting; then to automatically retract to rest position.

- With all drill-units fully retracted, the workpiece clamps open up, allowing the grille to be removed from fixture.
- The master stop switch returns all drill-units, slide and clamp to start position.

Working components can be adjusted to perform the work cycle in approximately four seconds to practical precision tolerances. Electric and pneumatic circuitry controls and related components adhere to J.I.C. Standards.

Design and construction features of the machine:

- . . . Pneumatic circuits for each drillunit, slide and clamps include controls for individual speed adjustment.
- . . . Built-in air controls enable operation of individual units with electric power disconnected.
- . . . Indexing slide is supported on hardened shafts and ball bearings within safety enclosures at either end to provide easy lateral movement with play well within tolerance limits.
- Hardened, spring-loaded lever forces workpiece against locators to position the workpiece end-wise before clamping.
- . . . Adjustable ½-inch diameter hardened steel limit-switch cam rods are rigid and free from deflection. These rods are supported by heavyduty brackets which are guided in hardened slots or by shafts operating in self-lubricating nylon bearings.
- . . . Upper clamp ends are fitted with

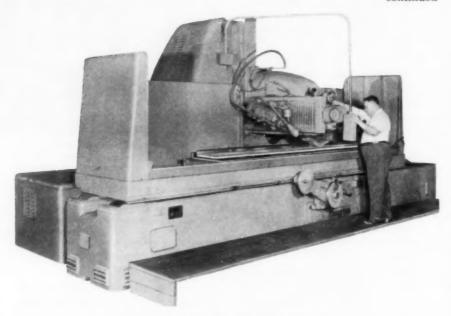


Automatic indexing selection is controlled by panel of 18 relays working with 12 signalling limit switches. Push-button control panel includes start and stop, and 3-position off-manual-automatic switches. Separate push-button switches individually operate each drill unit, index the slide, or actuate clamp members for machine alignment or adjustments. The "automatic" switch sets up the circuitry for automatic operation.

> heavy neoprene bumpers to cushion action and prevent damage to workpiece.

- .. Heavy safety enclosures protect personnel from moving parts wherever contact is possible during normal production operation.
- Electric and pneumatic circuitry are designed to meet J.I.C. requirements.

Mounted on four six-inch, heavy-duty casters for mobility, necessary strength of the assembled machine is achieved with welded channel "A-frame" construction and bridge-member cross bracing. Rigidity is sufficient to prevent distortion when only three of the four casters contact a rough floor. Dimensions, o.a., are 5 feet wide, 4 feet deep, 7 feet high. Weight is approximately two tons.



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Grinding Spline Rollers to .0005" Tolerance

There's no heat distortion, because hydraulic system of grinder automatically pumps exact amount of oil at pressure required

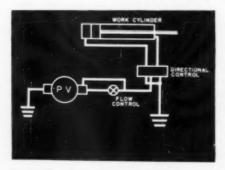
DETROIT—A Thompson Grinder (Type CXV 36" x 36" x 120" illustrated above with horizontal and vertical heads) grinds the 118" long machine ways for Michigan Tool's Roto-Flo Spline Rollers. After being flame hardened, these ductile iron ways must be ground to a total tolerance of .0005".

Until Hydra-Cool was installed on this grinder, these tolerances could not be held because of heat distortion. Accurate records have been kept on this machine since Hydra-Cool was installed, and these records show that in this 3-month period no variation in total tolerance has exceeded .0005" with average tolerances being held consistently to .0003" to .0004".

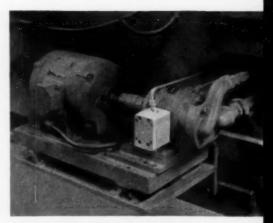
A new hydraulic system, called Hydra-Cool, developed by The Thompson Grinder Company, offers inherent design advantages in the control of hydraulic heat. Its substantial reduction in heat generation is accomplished through the automatic compensation of both pressure and delivery rate to absolute requirements without waste effort.

The pump, which is the heart of the system, is a self-compensating, variable displacement, vane type unit that automatically compensates for pressure requirements throughout each cycle of the table. The circuit contains no relief valves—only a simple spring-loaded rotor positioning device that reacts against pressure demand of the work load.

The pressure control of the pump consists of a sliding spring-loaded rotor opposed by a differential cylinder. This differential cylinder operates by sensing the pressure drop across the flow control or "feed rate" valve and, at the same



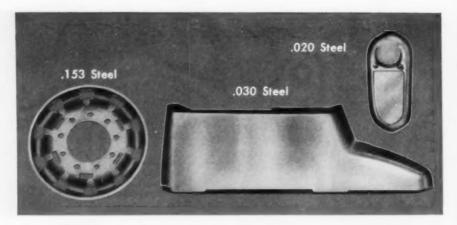
Schematic view of the new Thompson hydraulic system.



Pressure compensating mechanism (highlighted) is the "brains" of the Hydra-Cool hydraulic system.

time, sensing the required pressure to cause flow. If the feed rate valve is closed so that no flow and no pressure demand exists, the differential cylinder senses this and compensates the rotor accordingly. The pump never pumps a greater volume nor at a higher pressure than the actual demand of each phase of the operating cycle.

The circuit diagram shown illustrates the operation of the compensating feature. With the feed rate valve set to the predetermined rate of table travel needed, oil is directed to the table cylinder. System pressure automatically builds to that required to move the work load of table and fixtures at the required speed. Pressure conditions constantly change within the circuit as the table travels in each direction, stops and reverses in a constant sequence. The movable rotor of the pump, moving on anti-friction bearings in a horizontal plane, self-compensates for greater or lesser pressure and volume demands.



Prehm in one press stroke

Slow, costly, multiple "horn" operations and distorted edges due to "pinch" trimming can be eliminated by a Brehm Die. Operating on principles different than ordinary trimming methods, the Brehm "Shimmy" Die with angular cams causes the shearing edges to cut four ways in a single press stroke.

Materials, thickness, shapes and sizes look alike to a Brehm "Shimmy" Die. Whether it's stainless or mild steel, copper, brass, zinc, gold, fiber, silver, aluminum, rubber or plastic, Brehm users are assured of precise production results. Shapes can vary widely, whether a watch case, artillery case, refrigerator door, automotive or aircraft part. Clean, flat, burr free edges are assured. Edge contours can be straight or curved, with multiple notches and projections.

When model changes alter the part design, or if you wish to handle an entirely new part, you only need to substitute cutting adapters.

Send part prints to your tool room in Dayton for quotation on Brehm "Shimmy" and related dies, such as blank, form, pierce.



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DIES • SPECIAL MACHINES • VULCANAIRE JIG
GRINDERS • MOTORIZED ROTARY TABLES • BREHM
"SHIMMY" AND RELATED DIES • AUTOMATION

VULCAN TOOL CO. {YOUR TOOL ROOM IN DAYTON}





Brass cylinders (which house piston rods) are polished with 180 grit aluminum oxide belt. Rate of feed is controlled by adjustable angle of regulating wheel on right. Abrasive belt life is reported to be 1500 product feet.



Through fed at the rate of 20" to 32" per minute, the brass tubing is given high polish prior to applying protective coating. Method shown above eliminates scrap. 100% increase in production has been achieved.

Precision Belt Grinding of Piston Rods and Cylinders

GLENDALE, CALIF.—The production of pneumatic cylinders for use in drill press feeds, hydro checks, rotary index tables, etc. manufactured by The Smith-Johnson Division of The Bellows Company, Glendale, California, requires precision belt-grinding of stainless steel piston rods to a tolerance of .0005" and

surface finish of 8 micro-inches. Since the entire piston assembly (constructed of heavy steel plate and synthetic rubber piston cups) is housed in a brass cylinder enclosed at both ends, it is essential in the manufacture of these parts that the movement of the piston rod in and out of the cylinder be smooth,

Field Reports

continued



Stainless steel piston reds, used in manufacture of air cylinders, are precision ground in a single pass to .0005" tolerance with a surface finish of 8 micro-inches on this Engelberg centerless belt grinder.

steady, and accurate; even when the cylinder is operating on only a few pounds air pressure.

These qualities are now being obtained by precision sizing of the piston rod on an Engelberg Huller model L4 centerless belt grinder.

A 300% production increase has been achieved over previous methods of grinding and finishing. Formerly Bellows utilized a shop-built revamped lathe with a belt sander mounted on the carriage. Problems encountered were poor belt life, and excessive maintenance of the machine. Bellows currently uses a 400-grit silicon carbide abrasive belt backed by a 65 durometer

rubber contact wheel mounted on a ground spindle. The abrasive belt, run wet with oil coolant, is reported to be highly resistant to loading because of the flushing action of this coolant, which is jet-sprayed from the machine above the work area. Average belt life is 1200 product feet. (Belt changes take less than one minute.)

Parts are through-fed at the rate of 84" per minute; rate of feed is controlled by the adjustable helix angle of the regulating wheel and by change gears which drive the regulating wheel at different rpm. (For this application Bellows uses 52 rpm.) Change gears are readily accessible, requiring less than a minute to change from one ratio to another.

Among other uses, Bellows has found that this wet belt grinder also lends itself to polishing and finishing the brass cylinders that house the stainless steel piston rods. The tubes are first cut to lengths of 1½" to 36" and then fed to the centerless grinder for polishing. This produces the clean, bright, even-tone required before protective coatings are applied.

For this work 180 grit aluminum oxide belts are used; with a thru-feed rate of 20" to 32" per minute. Stock removal is .005" with a high quality uniform surface finish. Average belt life is 1500 feet of tubing. (Previously the cylinders were sanded by hand on mandrels. Operation was painstakingly slow, with no assurance of a uniform surface.) Present method eliminates scrap and has resulted in a 100% production increase.





DUAL PURPOSE RECIPROCATING TOOL GRINDER

Ex-Celi-O takes all the work out of both conventional and chip-breaker tool grinding

Now an entirely new reciprocating double end tool grinder designed by Ex-Cell-O to do two jobs in one—conventional grinding on one end, chip-breaker grinding on the other—has now been added to Ex-Cell-O's line of conventional, double end, carbide and Method X tool grinders. The difference is the adjustable, power-controlled reciprocation of grinding wheels. The operator

need only hold the tool at the pre-set angle.

See for yourself the capabilities of this new Ex-Cell-O—contact your local Ex-Cell-O Representative. Or, write direct for Bulletin 461872.

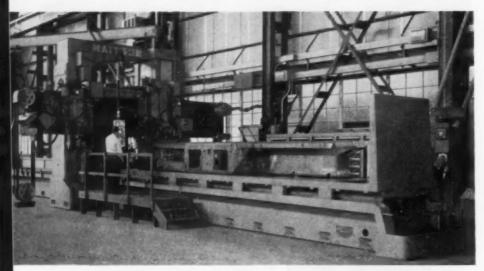


Machinery

Division

MANUFACTURERS OF PRECISION MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • TORQUE ACTUATORS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

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New 80-inch Mattison Plano Surface Grinder with both horizontal and vertical work spindles. Large machine casting is typical of work that can be handled on the giant machine.

Grinder Handles Work Up to 80 Inches Wide

Used for way grinding by Kearney & Trecker

• A new giant Plano Surface Grinder with two work spindles and capable of handling and grinding work up to 80 inches wide is announced by Mattison Machine Works, Rockford, Ill. Providing two powerful spindle motors enables a variety of surfaces on extremely large work to be handled in a single setup, thereby maintaining exceptional accuracy and precise relative alignment of all work surfaces. Further indication of the size of work that can be handled

on the giant Mattison Plano is provided by the 60 inch clearance under grinding wheels to the table top.

Both heads are controlled by the operator from the single pendant. An interlock system provides maximum safety in preventing machine and work damage by accidental depressing of a wrong control button. Table always starts in forward direction so that operator always knows direction of movement in advance.







There is a difference in end mills . . . MELIN end mills! Proof of this is evident in the continued increase in MELIN popularity. The growth in MELIN tool acceptance was by no means an accident . . . The secret is in CONSISTENT

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QUALITY. This
standard of Quality
assures you better
performance...
longer lasting
performance...
CONTINUOUSLY...
from one shipment to
another.
Next time you order
end mills...
specify the finest...

MANUFACTURED IN TWO, THREE AND FOUR FLUTE TYPES.

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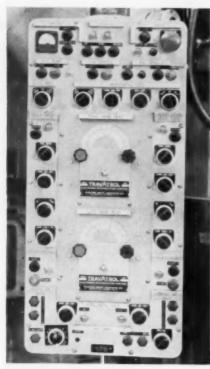
Representatives in principal cities.



MELIN TOOL COMPANY, INC.

3374 West 140th Street Cleveland 11, Ohio





Pendant control for Mattison Plano Surface Grinder shows how all machine controls are at operator's fingertips.

Among the machine controls provided at the pendant are cross-travel of both spindle heads (including reversal points), table speed, feed rate, raising and lowering of rail, inching table forward or reverse, plus stop and start of table reciprocation. To move the table to "out" position for loading, the operator merely depresses a "reverse out" button that automatically moves the table to end of its travel and stops the machine. To simplify the

operator's job, pilot lights on the pendant illuminate to indicate which controls are operative.

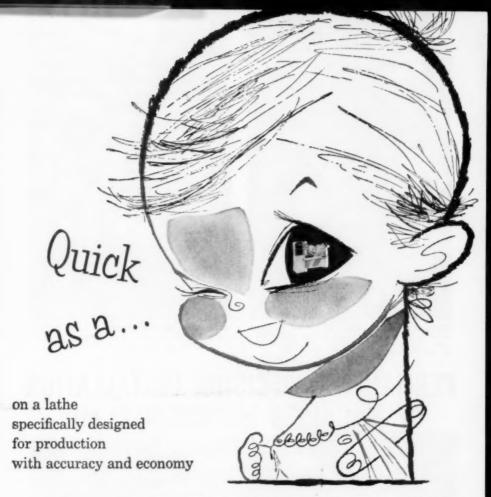
Both hydraulic and mechanical cross feed are provided. Hydraulic power provides both traversing and jump feed in increments from ½ inch to 4 inches. Particularly when the job calls for grinding of shoulders, mechanical micrometer cross feed in increments of .001, .002, or less can also be set at the pendant. Similarly, mechanical micrometer vertical feed in increments of .001, .002, or .0002 can be set at the pendant control and actuated either by pushbutton or by reversal of the cross slide or the table.

Table feed rate ranges from 5 to 100 feet per minute and cross slide from 5 to 30 feet per minute.

Typical of the advanced design features of the new Mattison Plano Surface Grinder is automatic lubrication of all principal moving parts of the machine. Lubrication system for the table is interlocked with the table drive control so that the table will not move when the machine is started if the table lubrication system is not operating properly.

Use of a built-in, direct-drive motor on the vertical spindle permits exceptionally fine finishes to be obtained. In addition, vertical head swivels up to 50 degrees each way, permitting the machine to grind "V" and flat ways, dovetails, shoulders, edges, radii, and contours all in a single setup.

Both spindles are provided with 30hp motors and a 40-hp motor is provided for the table drive. A total of 20 motors is used on the machine to enable



High speed turning, boring and facing are child's play... with the Lodge & Shipley HI-TURN

Lathe. Whether on single or multiple-piece work, this 10" Production Lathe provides

productive capacity at a price substantially below conventional lathes.

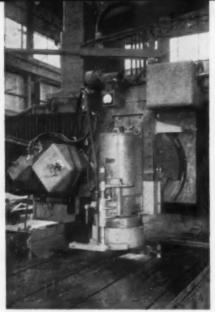
Designed for fast, convenient operation, it eliminates rarely used features, incorporates many standard features never before found at any cost in a lathe of this size.

The 10" HI-TURN gives you horsepower, rigidity and production you would normally expect to find in lathes costing twice as much. We can prove more production per lathe dollar...more production per operator hour!

Find out how the HI-TURN Lathe fits your turning requirements. WRITE: LODGE & SHIPLEY, 3074 COLERAIN AVE., CINCINNATI 25, OHIO

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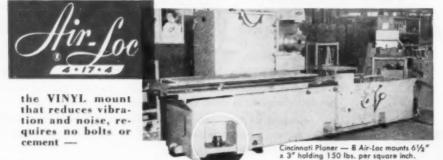


Vertical head swivels up to 50 degrees each way, permits machine to grind "V" and flat ways, dovetails, shoulders, etc. in single setup.



Horizontal spindle takes up to a 22-inch diameter by 6-inch face wheel.

PERMANENT PRECISION INSTALLATION OF MACHINES is POSSIBLE with



· Installations maintain accuracy to .0005" ·

Thousands of lathes, grinders etc. are now installed on patented Air-Loc mounts which can be re-used when machines are moved. Easy shimming for quick precision leveling. Write for free samples and literature.

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AIR-LOC DIVISION Clark, Cutler, McDermott Co.

> 3 W. Central Street Franklin, Mass.

the operator to control all movements from a single station with an exceptional degree of precision.

Horizontal spindle takes up to a 22inch diameter by 6-inch face wheel and the vertical spindle takes up to a 20inch diameter segmental wheel. A power-operated wheel-dresser for the horizontal wheel is included as standard equipment with the machine. A vertical wheel-dresser can be provided as optional equipment.

Weight of this new machine is approximately 250,000 lb. The base is 57 feet 8 inches long, and the table top is 60 inches wide by 24 feet long. Work up to 80 inches wide can be handled on the table.

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- · PIERCING
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PRODUCES MORE AND BETTER PIECES BETWEEN DIE CHANGES.



A graphited product for use in working hot metals of all kinds. Good in temperatures up to 2200° F and above. Keeps work cool and extends the life of dies and punches. Highly adhesive, may be applied by brush or swab or diluted with oil for spraying.

Bulletins describing Fiske's 514A Hot Die Lubricant and other specialty lubricants and coolants sent on request.





METAL WORKING LUBRICANTS

FISKE BROTHERS REFINING CO.

Newark 5, N. J. and Toledo 5, Ohio



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JEVIN "TURRET LATHES

PRODUCE SMALL INSTRUMENT PARTS BETTER

A small precision turret lathe for second operations and production of instrument parts. Available in two collet capacities, 5/16" or 3/16". The 6 position turret is self indexing and has hardened ways. Turret holes are 1/2" diameter. Turret travel 1-5/8". The cross slide has a swivel side at one end and a rigid tool block at the other. Lever collet closer provides quick opening and closing. A variety of turret tools with 1/2" shanks is available.

Send for catalog M describing complete line of instrument lathes, micro-drilling equipment and accessories. Louis Levin & Son, Inc., 3610 S. Broadway, Los Angeles 7, California



(See Kumber 1)



(See Number 2)



(See Number 3)

- 1. Screw Machine Products. Brochure gives pertinent information about Tourek products and includes a picture tour of the plant, showing all administrative and manufacturing departments. Twenty-one points explain in detail how to cut costs on screw machine products you specify. J. J. Tourek Mfg. Co., 1901 S. Kilbourn Ave., Chicago 23, Ill.
- Collets, Pushers, pads and accessories are presented in Catalog 57. Dimensions and net prices are given for the company's complete line. Sheffer Collet Co., Dept. BJ, Traverse City, Mich.
- 3. Nonferrous Milling Machines called "Mach-Mils" are introduced through 24-page Catalog 1162. It describes basic design principles, rotary feed tables, planer or reciprocating type tables on milling machines. Onsrud Machine Works, Inc., 7720 N. Lehigh Ave., Niles 31, Ill.
- 4. Surface Equipment. New types of precision surface equipment for tooling and production operations in metal-working and welding shops are described in Catalog 823. Included is complete information on three-point suspension surface plates, magnesium and semi-steel straight edges, parallel straight edges, and dovetailed straight edges. Challenge Machinery Co., Grand Haven, Mich.
- 5. Automatic Stamping Presses. Bulletin has complete descriptions and specifications of 15-ton to 4000-ton capacity automatic presses. They are of the inverted type with crankshaft located below the bed to produce lower center of gravity for minimum vibration at high speeds. These features make rapid die changes possible. Brandes Press Co., 6408 Euclid Ave., Cleveland, O.
- 6. "How Manufacturers improve Product Design and Perfermance" is a case history booklet which details how fabricators are using 17-4 PH and 17-7 PH stainless steel bar and wire. Serrated dials, high pressure safety valves, stacker springs, hydraulic pump shafts, and valve plugs are some of the applications reviewed. Armco Steel Corp., Middletown, O.
- 7. Copper and Copper Alloys. A tabbed, 60-page copper and brass warehouse stock list includes all items and sizes awaiting immediate shipment from the company's warehouses at Chicago, Cleveland, Milwaukee, Philadelphia, Providence. American Brass Co., Waterbury, Conn.

To receive copies of literature described on these pages, simply encircle corresponding numbers on handy postage-free Action Cards opposite page 64 and elsewhere in this issue.

continued

- 8. Cutting Tools. Book is guide to the services and facilities of a manufacturer of special carbide and high speed cutting tools. Form tools, step reamers, step drills, gang milling cutters, combination tools, etc., are pictured. Some are made from customer's drawings, others are the product of the company's design and engineering service. Wetmore Tool & Engin., 5320 E. Washington Blvd., Los Angeles.
- 5. Die Catalog covers line of Firthalloy dies and machinery and Diecarb perforators. Products are: square and hexagon shape drawing dies; round wire, bar, and tube drawing dies; rough mandrel nibs; rough cored heading die nibs; nail and tack tooling inserts; barbing laps; straight and button head perforators; wire puller jaw inserts; die finishing equipment. Firth Sterling Inc., 3113 Forbes St., Pittsburgh 30, Pa.
- 10. Grinding Machines, Wheels. Manual and automatic grinders, as well as grinding wheels, wheelholders, washing attachment, demagnetizers, and accessories, are illustrated and described with specifications, in bulletin from the Blanchard Machine Co., 64 State St., Cambridge 39, Mass.
- 11. End Mills. New edition of the Cleveland end mill book describes a new line of two-flute Hy-Spiral tools for nonfer-

- rous materials. Book also contains eight pages of information on the use and application of high speed end mills. Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland 14, O.
- 12. Stainless Fasteners. New 52-page stainless fastener stock list and data book includes illustrations, thread and design specifications of 40 basic fastening devices (screws, bolts, nuts, washers, rivets, etc.) available in a variety of corrosion-resistant metals. Allmetal Screw Products Co., Inc., Garden City, N.Y.
- 13. Investment-Cast-Metals Chart. An 11" x 17" two-color chart tabulates the composition and physical properties of alloys commonly used for investment castings—both frozen mercury and lost wax. Alloy Precision Castings Co., Dept. RH, 3855 W. 150th St., Cleveland 14, O.
- 14. Grinding Fixture. Three sizes of a multi-angle grinding fixture are presented in folder. Model A is 3" x 3", weighs 7 lb., work table tilts 90° plus 10°. The work table has three 10/32 T-slots. Model B is $4\frac{1}{2}$ " x 3", weighs 10 lbs. Model RT is also $4\frac{1}{2}$ " x 3", weighs 12 lb. This model rotates both ways, zero to 24 degrees. F. E. Smith, 840 S. Main St., Attleboro, Mass.
- 15. Magnetic Clutches. This clutch is fast, with precise control at acceleration and deceleration. The electrical assembly is isolated from clutch friction components, making possible exceptional speed. Fawick Airflex Div., Fawick Corp., 9919 Clinton Rd., Cleveland 11, O.



(See Number 8)



(See Number 9)



(See Number 10)

Staples CARBIDE TOOLS

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Twenty years of Carbide Tool making

Craftsmen at Staples of Cincinnati have been making finer carbide tools for twenty years and more. Behind each tool coming from the ultra-modern Staples factory is a long standing tradition of superior workmanship—your assurance that a Staples tool will cut production costs.

THE Staples TOOL COMPANY, 250 CHAMBERS THE COMPANY IS ON

Free Literature

continued

- 16. 2-H Plain and Universal Milling machines are fully illustrated in a broadside now available, No. 119. Detailed specs, are provided including speeds, feeds, table size, and facts concerning capacity and operations. The Greaves Machine Tool Co., 2600 Eastern Ave., Cincinnati 2, O.
- 17. Self-lubricating Bearings. Ledaloyl bearings, a product of powder metallurgy, are presented in new piece of literature. It lists and describes all items carried in stock as standard replacement parts. Johnson Bronze Co., New Castle, Pa.
- 18. Surface Plates. Booklet lists features of the plates, describes the granite used in their manufacture, shows how they are made, inspected and registered, and gives case history accounts of the plates in action. Last section of book tells how to order surface plates and describes other stone products manufactured by the Herman Stone Co., 1860 N. Gettysburg Ave., Dayton 7, O.
- 19. Super Precision Spindles are featured in leaflet. Dual assembly consists of external stationary precision housing, ball bearing equipped, with separate built-in oscillating housing with precision thread grinding spindle. The Standard Electrical Tool Co., 2488-96 River Rd., Cincinnati 4, O.
- 20, "New Reversible Heavy Duty Drill" details the one-third additional power, de-

- sign developments and complete specs. of the Thor "EN" series of %, % % and 1inch electric drills. Thor Power Tool Co., Prudential Plaza, Chicago 1, Ill.
- 21. Adjustable Gage. The Reana "Holocator" gage can be used for inspecting hundreds of different parts which normally require a separate gage for each part. Folder shows four of its many usesavailable from Reana Products, Inc., Box 555, New Britain, Conn.
- 22. Buffers. Specs. of 2-bearing heavy duty buffers are listed in leaflet available from Queen City Machine Tool Co., 3900 Kellogg Ave., Cincinnati 26, O.
- 23. Split Cutters. These Rick cutters feature "split construction," thus providing double the number of cutting points. They are used with pantographs, engraving machines, screw machines, routers and die sinkers. Pittsburgh Stencil & Tool Co., Pittsburgh 12. Pa.
- 24. "Minster Clutches For Press Conversions" is the title of a bulletin on clutch and brake for reconditioning and modernizing existing mechanical presses. Picture and caption stories of actual press conversion installations. Minster Machine Co., Minster, O.
- 25. Spot Welders. Catalog lists bench spot welders for small parts-for wire, sheet metal, foil, tweezer welding. Also described are vertical spot welders for welding all weldable metals and alloys from 0.0002" to its capacity. Eisler Engineering Co., Inc., 762 So. 13th St., Newark 3, N.J.



(See Number 16)

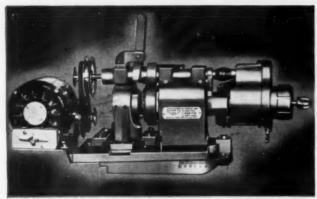


(See Number 17)



(See Number 18)

Precision circularity grinding attachment



Simple, speedy set-ups on this accurate attachment permit fast and easy grinding of form relief, a combination of form and radial relief, tapered cylindrical and straight cylindrical.

Model 500 Circularity Grinding Attachment is faster—easier to handle—has positive control—greater adaptability—rugged construction—is engineered and built to provide the finest precision work.



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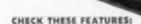
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DETROIT REAMER

CIRCULARITY GRINDING

ATTACHMENT

Grip-Tip CENTERS-Replaceable Carbide Tips



- 1. Long-life holders
- 2. Reduced machine down-time
- 3. Replaceable carbide tips lower operating costs
- Carbide tip concentricity accurate to .0003"
- No regrinding of holder . . . only carbide tip is reground
- Replaceable carbide tips cost less to stock.



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780 WEST MAPLE ROAD . P.O. BOX 174 . BIRMINGHAM, MICHIGAN



Free Literature

continued

- 26. Turret Lathes, tracing attachments, threading dies and taps, automatic lathes, automation equipment, boring machine, positioning tables, automatic thread grinders, optical comparators are presented in General Catalog No. 57, Jones & Lamson Machine Co., Springfield, Vt.
- 27. Bending Rolls, initial type, for forming sheets and plates into cylindrical and cone shapes are presented in Bulletin 220-H. Hendley and Whittemore Co., Beloit, Wis.
- 28. Micre-Velvet Balls made of chrome steel, stainless steel, brass, bronze, monel are pictured and described in Bulletin No. 101. Lapped high carbon chrome-balls are accurate within millionths of an inch. Hoover Ball and Bearing Co., Dept. BJ, Ann Arbor, Mich.
- 29. Vertical Mills. A 12-page catalog illustrates and describes 1 hp and 2 hp vertical mills, covering in full detail the cost cutting production features. Famco Machine Co., 3100 Sheridan Rd., Kenosha, Wis.
- 30. Clear wax emulsions for protective coatings and dry film lubricants are discussed in a series of booklets. Suggested uses are protective dressings for rubber, plastics, leather and metal. S. C. Johnson & Son, Inc., Racine, Wis.
- 31. Automatic marking machine. Bulletin SM57 describes this machine for engine

- cylinder block control and identification. It marks thin wall sections without cracking and increases marking die and machine component life. New Method Steel Stamps, Inc., 147 Jos. Campau, Detroit 7, Mich.
- 32. 400 components for jigs and fixtures are listed in catalog No. 26-A. For example, three new socket types (knurled shaft, knurled head, hand knob) are interchangeable with snap on-snap off round or V-pads. Northwestern Tool & Engrg. Co., 118 Hollier Ave., Dayton 3, O.
- 33. Edge Finder is a tool for locating holes in drill jigs, dies, tools and machine parts. It makes possible the same location of a hole, in several pieces, to a .0003 tolerance. Leaflet from Glover Mfg. Co., 422 Park Ave., Meadville, Pa.
- 34. Standard flexible shafts for power transmission are featured in bulletin 250. There are listed 7 sizes ranging from ¾" through 1¾". Included are full scale drawings, max. recommended speeds, max. operating torque straight, and chart for determining proper flexible shaft. B. W. Elliott Mfg. Co., 350 State St., Binghamton, N.Y.
- 35. Shoplifter. Leaflet describes 750 lb. cap. machine, built for overloads. All steel construction, compact design for narrow aisles. Economy Engineering Co., 4511 W. Lake St., Chicago 24, Ill.
- 36. Push Broaches. The Glenny adjustable push broaches are ground to any accuracy



(See Number 26)



(See Number 27)



(See Number 28)

all the EXTRAS

Spacemaker Cylinders

- NEW exclusive ingenious cushion designs . . . Super Cushion Flexible
 Seals for Air . . . New Self-Aligning
 Master Cushion for Oil.
- STRONGER than outmoded tie rod design, proven through actual tests. No tie rods to stretch.
- SOLID STEEL HEADS throughout the full line.
- COMPACT DESIGN eliminates tie rods, increasing the strength and reducing mounting space required, providing extra room for adjacent equipment.
- HARD CHROME PLATED body bores and piston rods... assure you of long trouble-free service. (Standard at no extra cost.)
- METALLIC ROD SCRAPER, not just a wiper, actually removes foreign matter from the rod.
- PILOTED PACKING GLAND with extra long bearing. Additional strength and support to the piston rod.
- Oll pressure to 750 p.s.i. AIR to 200 p.s.i.

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OFF THE SHELF!

You sare 40% space when you switch from outmoded tie rod cylinders to the T-J Spacemaker! It's stronger, too! Fits right into automation programs in countless plants. Delivers top performance and dependability with a big plus in advanced features. Wide range of styles, capacities . . . reduces man-hours and costs in all kinds of push-pull-lift operations. Off-shelf delivery in 64,000 combinations!

NEW LITERATURE—Send today for new Catalog SM56 with complete engineering details on Spacemaker line. Write The Tomkins-Johnson Co., Jackson, Mich.

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RIVITORS AIR AND WYDRABLIC CYLINDERS CUTTERS CLINCHORS

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Free Literature

continued

- of ±.0005—for precision keyways fast. Eliminates expensive set-up time. Folder from East Shore Machine Products Co., 50 East 201st St., Cleveland 23, O.
- 37. Additions of Broaches to the Minute Man standard stock are listed in 16-page catalog. Nine new sizes of keyway broaches plus other lines are listed. du-Mont Corp., Greenfield, Mass.
- 38. Controlled-Penetration End Mills are accurate in cut and tool life. Literature describes staggered notches in cutting edges which produce lobes—the end result a uniform bit with a minimum of deflection. DoAll Co., DesPlaines, Ill.
- 39. "For Positive Hold-Down in Drawing or Forming" is a booklet on the Barrett Die-Draulic grip. This grip is easily installed on the press, eliminates die pad pressure problems, and reduces stamping costs. Available from Die-Draulic Grip, Inc., 1440 Front Ave., N.W., Grand Rapids, Mich.
- 40. Press Brakes. Bulletin 90 introduces a new press brake that combines streamlined appearance with advanced power features. Illustrated are electro pneumatic friction clutch, power brake, and power treadle. Clutch and brake work together, permitting the ram to be inched down smoothly. Niagara Machine & Tool Wks., 683 Northland Ave., Buffalo, N.Y.

- 41. Air and Hydraulic Cylinders. A new 12-page booklet includes complete information and engineering specifications regarding five types of cylinders: air and low pressure hydraulic; high pressure hydraulic; Pemaco air and hydraulic; automation standard air and hydraulic—1" to 10". Petch Mfg. Co., 463 York, Dept. BJ, Detroit, Mich.
- 42. Air Blow Guns in various types; spray guns for mold spraying, cleaning; blow valve; safety chip gun; air spray nozzle; oil mist lubricator; swivel connector; air hose couplings are described and illustrated in Catalog No. 6. C. A. Claflin Co., 15 Hathaway St., Boston 10, Mass.
- 43. End Mills described in Bulletin 110A are one piece, thereby distributing the load evenly among the flutes, increasing tool life. Also featured is a bore reamer. Dixie Tool Industries Inc., 4555 W. Franklin, Bridgeport, Mich.
- 44. Stainless Steel Govt. Specs. can be easily identified with a new chart. Shown are chemical analysis requirements for most frequently used military, Air Force-Navy aeronautical specs. Peter A. Frasse & Co., Inc., 17 Grand St., New York 13, N.Y.
- 45. Die Buttons mate your punches perfectly. Special punches, any size or shape, fabricated from special alloys, and retainers for close spacing of punches are described in folder available from Future Products Tool Corp., 885 N. Rochester Rd., Clawson, Mich.



(See Number 48)



(See Number 41)



(See Number 42)

"All he did was suggest Chicago Latrobe Gun Drills...



More than one production man has pulled his shop out of a tough spot by discovering that Chicago-Latrobe gun drills offered a new and practical way to do certain difficult drilling jobs. Consult your Chicago-Latrobe distributor. He's had wide experience in this specialized field, and he has a C-L Service Engineer available to him who rates as the final authority on gun drilling.

Chicago-Latrobe Latrobe GUN DRILLS FROM YOUR CA DISTRIBUTOR

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46. Magne-Carrier. Bulletin describes how the new magnetic system of carrying parts along on overhead conveyors eliminates clamps, hooks and other positioning and attaching methods and employs magnetic principles. Multifinish Mfg. Co., 26341 W. 8 Mile Rd., Detroit 19, Mich.

47. Welding Blowpipe. The Oxweld W-47 is capable of welding metal thickness from 28 gauge sheet to 3-in. plate. It is able to handle gas flows as low as 2 cu. ft. per hr. for precision welding. Cutting at-

tachments convert it from welding and heating to flame-cutting. Booklet available from Linde Co., Div. of Union Carbide Corp., 30 E. 42nd St., New York 17, N.Y.

48. Cold Heading Die Steel for fastener industry has shown wear resistance advantage. This Hedervan is suitable for all water hardening carbon steel applications. It can be adjusted to desired quenching temperature with no loss in toughness. Leaflet from Latrobe Steel Co., 2626 Ligonier St., Latrobe, Pa.



These are just a few of the superior features of "RFC" Automatic Roll Feeds. There are many other wanted features designed to increase precision production. Write for our new illustrated brochure.

No Ratchet or Pawls To Wear Down

Can't Slip—Each Wedge Has
 4 Points of Contact

 One Piece Shaft and Roll Ground From Solid Bar To Maintain Perfect Alignment



MANUFACTURER OF QUALITY FEEDS FOR POWER PRESSES

49. Portable Handi-Cut. Hack saw gives smooth, straight cuts that save subsequent machine operations. Cap. 4" x 4". Peerless Machine Co., 1600 Junction Ave., Racine, Wis.

50. "Open Die Rod Headers" presents machines which are used to upset heads on comparatively long rods which cannot be handled on automatic rod headers. Spectables and pictures are included. Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

51. Wall Chart on Steel Bars. Listed are 241 grades of steel bars with their complete chemical analysis. Machinability ratings are given in sfpm or as percentage rating compared to AISI Grade B1112. La-Salle Steel Co., 1420 150th St., Hammond, Ind.

52. High Speed Tool Bits are featured in booklet which helps specify proper bit for any application and will be found a ready reference for those seeking the best in tool performance. Vanadium-Alloys Steel Co., Latrobe, Pa.



WOODWORTH CHUCKING EQUIPMENT

Our tough looking character who is holding the little bird clearly demonstrates one fact: whenever you are holding onything it should be secured with gentle firmless. And this is so true when considering thanking equipment.

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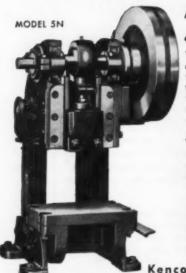
53. Heavy Duty Holder. This quick-change holder is well suited to heavy cutting in die sinking operations. The three-piece device provides a positive square drive, back-up screw top and depth adjustment. Universal Engineering Co., 126 N. Main St., Frankenmuth 10, Mich.

54. "How to Get Better Welds" is a revised edition of Weldors' Vest Pocket Guide containing 60 pages of useful arc

welding information on metals and electrodes, welding procedures and selection of welding electrodes. Hobart Bros. Co., Troy, Ohio.

55. Double Angle Shears. Bulletin DA-2345 features multiple performance possible with two cutting sides in the shearing of structural angles, bars, rounds and flats. Hanson & Stevens, Inc., 11 No. Wacker Dr., Chicago 6, Ill.

KENCO 5-TON PRECISION-BUILT PUNCH PRESSES



High speed punching... at low cost

These sturdy presses punch accurately and reliably at speeds up to 285 strokes per minute. Kenco-built for simple maintenance and long life, they save you time and manpower. Rugged, multiple-rib frame has tremendous strength...extra-long ram guides permit full use of the guiding area down to the bottom of the stroke for extra precision.

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provide low-cost solutions to many punching problems: Model 5 Standard (variable speed), Model 5-N Standard, Model 5-NR deep-throat (12¾" throat), Model 5-NA Universal 4-in-1 press, Model 5-A Universal Vari-speed, Model 5-R Vari-speed deepthroat.



Kenco presses - 14 models - 2 to 15 tons
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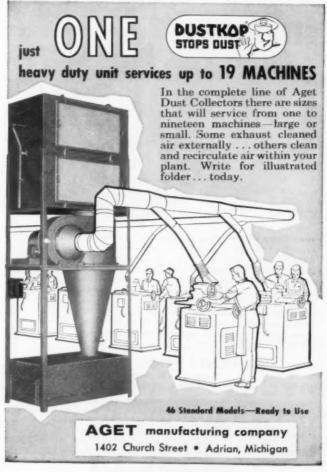
5211 Telegraph Road, Los Angeles 22, California

56. Hydraulic Milling Machines. The drive on this machine is simple and direct. The spindle and hydraulic pump are driven by standard foot-mounted motors. Leaflet available from Kent-Owens Machine Co., 958 Wall St., Toledo 10, O.

57. Angle Iron Shear. Bulletin gives information on No. 4 angle iron shear capable of cutting 2" x 2" x ½" stock. Also described are two allied tools, a bender

and notcher, and the three tools can be combined in one. Whitney-Jensen Metal Tool Co., 110-114 Forbes Sts., Rockford, Ill.

58. Automatic Pinch Jaw Chucks. Bulletin describes how tooling problems encountered when machining parts of large diameter and small cross sections are overcome. For precision machining of jet engine discs and rings. The Cushman Chuck Co., Hartford 2, Conn.



59. Tumbling Abrasive for barrel finishing. This material is aluminum oxide abrasive in chips and screened grain sizes for a wide range of use. Simonds Abrasive Co., Tacony & Fraley Sts., Phila. 37, Pa.

60. Automatic Positioning Spacer Table. Leaflet claims drilling and tapping may be performed without need of jigs. Construction makes possible performance of heavy duty drilling. Industrial East Co., P.O. Box 561, Clifton, N.J.

61. Semi-Automatic Gear Deburring Machine. Model MA-660 is used with a pollshing lathe to deburr gears, splines and serrated parts. Work head rotates at 80 rpm and can be adjusted vertically and horizontally. Hammond Machinery Builders, Inc., 1614 Douglas Ave., Kalamazoo, Mich.



No ordinary bench drilling machine, but an extremely accurate, high speed, sensitive machine for precision drilling. Drills from $\frac{1}{4}$ " down to extremely small sizes. Successfully used down as far as .008".

Table and column exactly squared, one to the other, and built with strength and rigidity for maintained accuracy. Hardened and ground spindles insure long life. Sealed ball bearings throughout for smooth operation from 4,000 r.p.m. to 10,000 r.p.m. Motor, driving belt, and spindles entirely enclosed for safety. Available with 1, 2, 3 and 4 spindles.



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(Division of The Smyth Mfg. Co.)
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INCORPORATED
West Hartford 1, Connecticut

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Uniform Chamber Temperature	V	
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No Scale or Decarburization	V	
Sharp Edges Maintained	V	
Consistent Maximum Hardness	V	
Maximum Tool Life	V	
Quality Results — Easily Duplicated	V	

The Sentry Furnace with the Sentry DIAMOND BLOCK METHOD of ATMOSPHERIC CONTROL brings new economy and efficiency in hardening all types of high speed and high carbon high chrome steels.

If you're getting less than SENTRY quality and performance — you're burning up profits, too! Check SENTRY against your furnace, point for point.

For final proof consult Sentry for a demonstration hardening of your high speed steel tools at no obligation.



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 Designed for use on air lines up through 2 inches in size.
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All sizes lubricate from 5 PSI to 250
PSI (with metal bowls) and from
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corresponding line size, with finely
"ATOM-IZED" oil fog at all volumes.

 Lubricators larger than 1 inch require 10 to 15 CFM to operate.

 No need for special units for each installation; low and high CFM equipment can be lubricated from one unit.
 Oil fog increased in proportion to increase of CFM.

· Right or left hand installation without alteration.

 Large double filler plugs enable filling from either side without shutting off air line.

 Visible sight glass permits observance of oil flow, assuring proper lubrication at all times.

 Furnished with either handy knurled knob or sealed "tamper-proof" adjustment.

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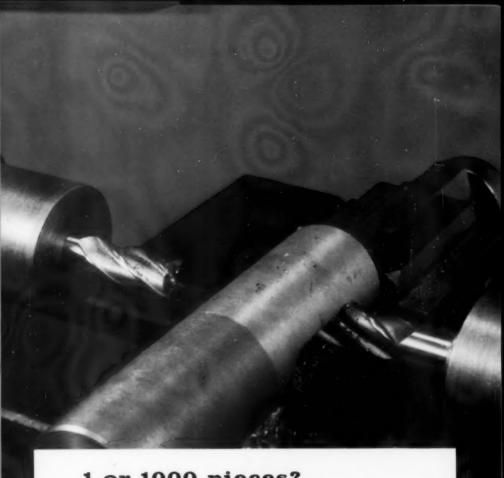
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The precision finish of shanks, uniformity of cutting teeth, exactness of size, combine to give you a rugged End Mill that is smooth and accurate in operation.

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December, 1957

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NMTBA Holds Annual Meeting

The 56th annual meeting of the National Machine Tool Builders' Association was held at the French Lick-Sheraton Hotel, French Lick, Ind., Oct. 23-25.

President's Address

At the first general session, Jerome A. Raterman, president of the Association and chairman-president of the Monarch Machine Tool Co., disclosed his views regarding the present state of the machine tool industry.

"Our immediate past experience has of course had a strong effect upon our frame of mind," he said. "The substantial upturn in the volume of our sales that started in the fall of 1955, following the Machine Tool Show, and continued for over a year, has set a new peacetime record for our industry.

"Life would be wonderful if this could just go on, and each year would take us to more lofty peaks. But this sort of thing, if prolonged, would stifle progress, make us lazy and extravagant, and eventually retard our entire economy."

Commenting on the evils of inflation, Mr. Raterman warned ". . . it is high time that all industry recalls the slogan of our own industry—'More goods for more people at lower cost.'"

Getting back to the immediate situation in the machine tool industry, he noted that this year's total shipments (\$800,000,000, estimated conservatively) have been exceeded in only four of the last thirteen years, three of which "reflected national defense demand due to the Korean crisis."

New orders, on the other hand, tell a less encouraging story, Mr. Raterman admitted. Taking a three-months average as an indicator, he observed, "New orders in July, August, and September of this year have averaged about \$43,000,000 per month. If this average should be maintained in the future it would indicate an annual volume of about \$516,000,000 per year."

He advised his listeners, however, that before they start "singing the blues at any such prospect" they go back and make a few comparisons. The years 1946 to 1950 and the years 1955 and 1956 represented peacetime business, he said. "What was our average annual production for those seven years? The average was \$434,000,000 a year—an amount considerably below what we can expect today if new orders continue at the present rate.

"That is one reason why I cannot get particularly alarmed about the present situation. The other reason why I can't get alarmed is the fact that we have always had fluctuations in volume in the machine tool business, and yet we have gone right on earning a profit. As I once expressed it to a friend of mine, 'When the machine tool business is good, it is very good, and when it is bad, it is still pretty good.'"

Many business analysts and financial commentators have a distorted conception of the status of the machine tool business, Mr. Raterman continued. "The tradition of feast or famine, boom or bust, has been with us for years . . . Of course we have had great variations in volume, due chiefly to defense emergencies, but our record of earnings and dividends is one of remarkable stability."

Looking to the future, Mr. Raterman almost dismissed the markets of national defense, export, and plant expansion by placing them in the can'tbe-depended-upon category insofar as new business is concerned. The replacement of old and obsolete machines by new models is the big market today, he maintained.

"Many people may not realize that in spite of all the machine tools we have sold in the last few years, obsolescence is still on the increase in the metalworking plants of the United States. According to current estimates, 68% of metal cutting type and 65% of metal forming type machine tools now in use on plant floors in this country are over 10 years old, and 17% of metal cutting types and 35% of metal forming types are over 20 years old. . . . There is enough potential business in replacement alone to put our sales on an ascending scale, aside from sales for de-

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Baldor RINDERS

Lubricated for life ball-bearings never require servicing! Capacitor run motors withstand repeated overloading. Most rugged, durable grinders made!

- · Totally enclosed, splash-proof motors protect against dust, grit, metal particles. Can't clog . . . can't cause trouble!
- Dynamically balanced for smooth operation. less vibration.
- Grinders for every need. 1/4 to 3 HP, 6" to 12" individually balanced wheels. Bench and pedestal types.
- All models fully guaranteed.

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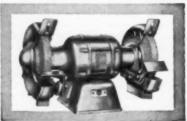
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Model 153-8". Provides maximum working room around wheel. Ideal for grinding long or odd-shaped pieces. 1/2 HP, 3450 RPM, 36 and -



Carbide Tool Grinder, Specially designed for precision work. Reversible 1/2 HP motor, 3450 RPM, 11/2" wide wheels.





9" column 3'-4' arms



9"-11" column 3'-4'-5' arms



13"-15"-17" column 4'-5'-6'-7' arms



19" column 6'-7'-8' arms



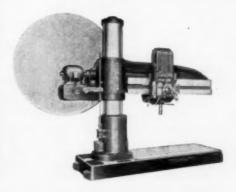
22"-26" column 7' to 12' arms

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Carlton has specialized in radial drill research, engineering and manufacturing since 1916. Our close contact with—and intimate knowledge of industry's drilling requirements—have produced a wide line of the most modern and up to date radial drills. Made in arm lengths from 3-ft. to 12-ft., column diameters from 9" to 26". Programming, pre-select and manual speed-feed controls, plus special bases, tables, and jigs available for additional productivity. For further information, send today for free descriptive bulletins.

The Carlton Machine Tool Co., Cincinnati 25, Ohio.



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fense, or export, or plant expansion."

Speaking of the direct savings in operating costs to be gained from the replacement of obsolete machine tools with the faster more dependable new models, Mr. Raterman pointed out, "With present tax rates, a company can never recover more than 52% of the cost of a machine through depreciation. Faster depreciation can only increase the cash flow on 52% of the investment -nothing more. The remainder of the cost of the machine, a whopping 48%, must be recovered through earned profit. Furthermore, a new machine may pay for itself, many times over, long before 52% of its purchase price may be recovered through depreciation. Our sales job is to persuade customers and prospects to buy new machine tools because they need them right now, today, in order to continue to make a profit in the drastically competitive picture that now faces all American industry."

In summing up his remarks, Mr. Raterman asserted that he is looking toward the future with much confidence for these reasons:

"First: The figures on age and obsolescence of machine tools now on the plant floors of the United States indicate an enormous potential replacement market:

"Second: Above and beyond this market lies the future demand for new machine tools for plant expansion projects delayed, but not abandoned;

"Third: The rate of research and product development within the machine tool industry is today so rapid that a machine that many a company thinks is 'good enough' today will not be good enough for tomorrow."

Mr. Raterman concluded his address on this optimistic note: "Let's take today's situation in our stride, as we have so many times, up or down, in the past, firm in the conviction that we can adjust our affairs to current conditions, plan for the future, and keep on doing business at a profit. That is what I intend to do in my business, and I'm sure that is what you intend to do in yours."

NMTBA officers for 1957-58

Jerome A. Raterman presented his president's gavel to Alfred V. Bodine, president and treasurer of the Bodine Corp., Bridgeport, Conn., on Friday, Oct. 25, just before adjournment of the 56th annual meeting of the National Machine Tool Builders' Association.

Ralph J. Kraut, president, Giddings and Lewis Machine Tool Co., Fond du Lac, Wis., is the new first vice-president of the organization, and Alan C. Mattison, president, Mattison Machine Wks., Rockford, Ill., is now second vice-president.

Graham E. Marx, vice-president and general manager, the G. A. Gray Co., Cincinnati, O., was elected treasurer, and Walter K. Bailey, president of the Warner & Swasey Co., Cleveland, was re-elected secretary.

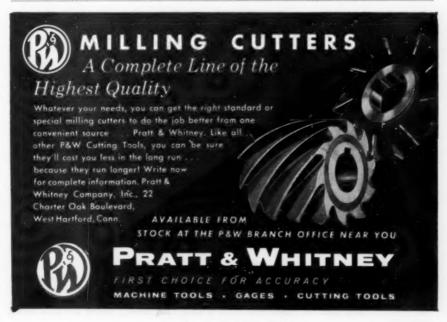
New directors are Mr. Mattison, Mr. Marx, and Julian C. Pease, exec. vice-president, the New Britain Machine Co., New Britain, Conn.

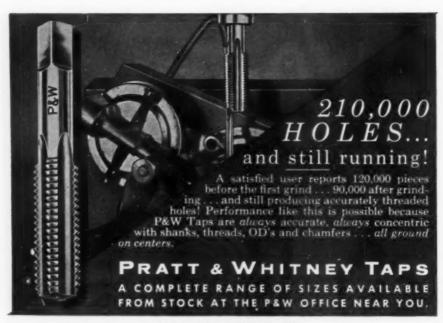
Ludlow King was re-elected executive vice-president of the Association.

Pipe and Tubing Fabrication

To meet the pipe and tubing fabrication requirements of its customers, Vogel Tool and Die Corp., Melrose Pk., Ill., has expanded its operations to include a fully equipped fabricating department.

"Here customers are offered a solution to their pipe and tubing fabrica-





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tion problems through low cost tooling as well as low cost production rates," a company spokesman said. "This applies not only to cutting and notching but also to piercing, flaring, slotting, bending, and many other operations for which equipment is available."

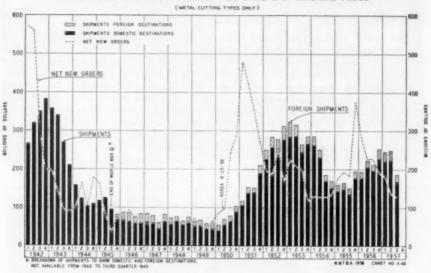
Cutting tool manufacturer moves

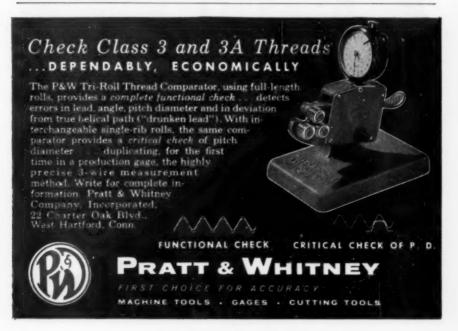
After 16 years at 19326 Woodward Ave., Detroit, Keo Cutters, Inc. has moved to its own newly built factory at 25040 Easy St., P.O. Box, Roseville, Mich.



ARTIST'S DRAWING of the new home of Joseph T. Ryerson & Son, Inc. in Charlotte, N. C. Completed at a cost of over \$1,000,000 for building and equipment, the big stainless steel sheathed steel service plant is several times larger than the former quarters from which the company had been doing business. Bar, structural, plate, sheet and tubular steel is cut to order, using sawing, shearing and flame cutting equipment.

QUARTERLY SHIPMENTS AND NET NEW ORDERS OF MACHINE TOOLS





Sealol acquires Acra-Ment line

The Sealol Corp., Providence, R.I., has announced the organization of its new Acra-Ment instrument division, established to manufacture and market a complete line of precision indicating gages, consequent to the recent acquisition of the Myer Corporation's indicating gage line. The facilities of Sealol's Anchor tool and die division will be utilized in the manufacture of these sensitive gaging instruments.

Mill holds technical seminar

The Cincinnati Milling Machine Co. conducted a technical activities seminar Oct. 4-10 which was attended by more than 1200 executives and engineers from all over the country. Research at the Mill runs the gamut of the physical sciences and their engineering applications in mechanics, hydraulics, and electronics, in physics, chemistry and ceramics.

Discussions dealt with research find-

NEW Spee-D-Thred

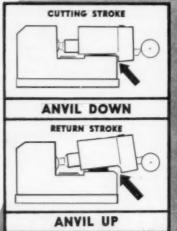
time in half on reversible lathes



Set the SPEE-D-THRED for the depth of the first cut, lock in the lead screw and make the cut. In cutting, the downward forces hold the tool absolutely rigid without chatter. Accuracy of manufacture assures a repetitive cut and cutting of threads as accurate as the lathe.

At the end of the cut, reverse the lathe with the lead screw still locked in. The anvil rises to allow the heel of the tool to ride the thread back without marring.—then drops into place for the next cut. No need to back off the cross slide or disengage the feed nut, and the lead screw is always in perfect register.

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WARNER DEVELOPMENT CO.

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ROCKFORD, ILLINOIS



In checking with the tool, die, gage and general production shops that use SAN-FORD SURFACE GRIND-ERS, the most frequent comment was that Sanford Grinders were the "most used" of any grinders in the shop.

PARTIAL SPECIFICATIONS-

Capacity - 8" x 12" x 12".

Table travel - 13", traverse 83/4". Vertical clearance 12" under 7"

Standard grinding wheel - 7"x 1/2", 11/4" hole.

Spindle speed approx. 3000 RPM. Motor, 1/2 HP, single or 3 ph., dynamically balanced.

Floor space - 45" x 38" x 62" high. Net wt. with stand approx. 630 lbs,

Others have tried to copy but there's a "feel" that comes from the precise individual quality and workmanship that goes into every SANFORD GRINDER. It's the factor that can't be found in any other grinder.

> So widely used you can ask users in your own area how they like the low priced Sanford Surface Grinder.

Write for illustrated and fully descriptive literature, reconditioning facilities, optional equipment and prices.

Representatives in major industrial areas

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ings and development engineering ranging from the numerical control of machine tools to the problems of machining the new hard-to-machine alloys that are vital to supersonic planes and guided missiles, and from new ways to form metal by chipless machining to the use of ceramic cutting tools.

Through the medium of TV, visitors saw certain research activities and equipment which could not be installed in the auditorium because of size or other factors. The telecasts originated in a laboratory and were used by various speakers in the auditorium to illustrate some of the significant research and engineering developments discussed.

During the Seminar, a Spiropoint drill



SAVES 80% on machine installation costs (Am. Type Founders) 20% on production-labor costs (Colo. Fuel & Iron Corp.)

Here are three reasons Barry Mounts will give YOU these savings:

You don't have to drill floors, set anchors, and lag down machines.

Just put a Barry Leveling Mount on each machine foot and set the machine right where you want it. The built-in vibration control won't let the machine "walk".

You can easily move any machine - anywhere.

All you do is pick it up and set it down in its new location. It's back in production in minutes.

You don't have to fuss with shims to get the machine level.

Just turn Barry-mount leveling screws and tighten locknuts.

Ask for: Reprint of "The Iron Age" report on proved savings; Plant-survey Chart showing cure for 8 production losses.

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LIQUID ABRASIVE BLASTING

Vapor Blast Liquid Honing is the original liquid abrasive surface conditioning process developed and perfected by the Vapor Blast Mfg. Co. It has proved itself in finishing, cleaning, descaling and deburring operations in scores of industries and many hundreds of plants.

When a process proves so outstanding that it improves jobs, speeds up operations and cuts costs as much as 80%, its name may become generic. Of all the liquid abrasive methods in existence, only one has earned rights to the names Vapor Blast and Liquid Honing — always capitalized.

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Send complete information about applications of Vapor Blast Liquid Honing in(industry).

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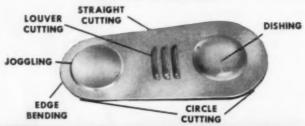
CITY

grinder was introduced. This machine generates a spiral point on twist drills. Demonstrations sought show that a spiral point drill gives better cutting action, is more productive and reduces drilling costs. This grinder will be marketed by the company's subsidiary, Cincinnati Lathe and Tool Co.

In a demonstration of the Mill's remote control system for machine tools, a visitor in the auditorium was chosen to operate a machine 1000 feet away in a laboratory. No mechanical linkage between the machine and the operator was required. The audience watched the demonstration on a large TV screen on the stage. This system has application on large machines where the operator's control station is some distance from the area of cutting action, or on machines cutting radio-active material where the operator is separated from the machine by an effective shield.

PULLMAX METALWORKING IDEAS

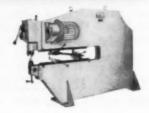
This safety guard for a chain drive made complete on a PULLMAX



Pullmax machines have the versatility to do all of the metalworking jobs in your Model Shop, Engineering or Maintenance Departments.

One machine does straight shearing, inside or outside circle cutting, design cutting, inside square cutting, beading, joggling, slot cutting, louver cutting, dishing, edge bending and flanging. Seven sizes of machines cut up to 1½" in mild steel. Ask for a demonstration.

Write for the Pullmax Catalog on Money-Saving Metalworking ideas.



AMERICAN PULLMAX COMPANY

2473 North Sheffield Avenue * Chicago 41, Illinois



Buhr buys lathe company

Buhr Machine Tool Co., Ann Arbor, Mich., has announced the purchase of the Sidney Machine Tool Co., Sidney, O., thereby adding a line of standard equipment to Buhr's line of special multiple-spindle machinery.

The newly acquired company will be operated as a wholly owned subsidiary. It will continue to be engaged ex-



Joseph Buhr



Wilbur Gerchow



Feed high-speed production machines automatically with

FEEDALL AUTOMATIC PARTS FEEDERS

YOU NAME the part and the flow rate...a Feedall machine will provide high-speed delivery, feed or transfer of small parts in a fully automatic operation. Versatile Feedalls handle rolling or sliding parts, valve slugs, rings, bars up to 1½" x 30" long, and scores of other high-production pieces.

TYPICAL USES include hopper-load elevating, blade or rotary feeders for centerless grinders, presses, milling machines, heat-treat machines and similar production units.

DETAILS are contained in latest Feedall catalog, complete with estimate data sheet. Write for your copy today.

Feedall

Producers of automatic feeding devices FEEDALL, INC. • WILLOUGHBY, OHIO

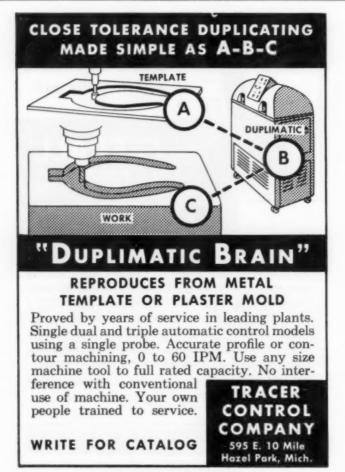
clusively in the manufacture of Sidney lathes and coil winders.

Administrative officers of the Sidney Machine Tool Co. will be Joseph H. Buhr, president, and W. R. Gerchow, executive vice-president and general manager. Mr. Buhr and Mr. Gerchow also hold these offices for Buhr. They will keep their present headquarters at Ann Arbor.

Third Contour Machining Conference held at L.A.

The third annual Contour Machining Conference opened on Wednesday, October 23 at the Ambassador Hotel in Los Angeles with a registration of approximately 800 conferees.

The welcoming address was delivered by George F. Fry, Jr., chairman of the



conference committee and president of True-Trace Corp., sponsor of the conference.

The evening banquet, high point of the conference, featured an address by Brigadier General Raymond A. Davis, USAF.

Thursday afternoon, a field trip to the True-Trace Corp. plant at El Monte, Calif. gave the conferees an opportunity to see the many types of control equipment at the company's plant.

A tape recording was made of all panel discussions which, together with the complete text of the technical papers, will be made available to all conferees when publication is completed.

Standard Gage convention learns of new products

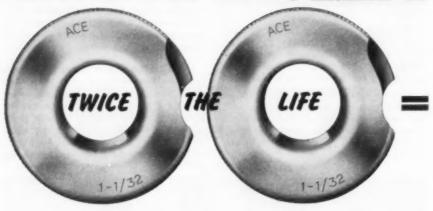
New products and better servicing for users were top subjects of a three day sales convention (Oct. 28-30) at Standard Gage Co., Poughkeepsie, N.Y. The meeting was attended by direct sales representatives from principal industrial areas.

Chief among new products are a reedtype shallow diameter gage with wide range of applicability, and a 53" comparator height gage for large surface plate setups. In addition to new items emphasis was placed on aiding those users of the company's dial indicators who prefer to do their own servicing.



To prove its ruggedness and resiliency, P. L. Krueger (left) and J. E. Aldeborgh crouch on new shallow diameter gage and master. The test demonstrated that the gage was unaffected by the weight temporarily placed on it. Indicator hand returned to its original position after over 300 lb. of men stepped off, showing that the metal took no "set" from this weight. Others in photo are D. C. Cunningham, (front) and D. H. Aldeborgh, H. A. Babb, K. E. Wandel, G. E. Hauselman, R. C. Gould, E. L. Sweet standing, left to right.

The COST of a drill bushing depends on



Traveling Exhibit

"The Story of Measurement" is beginning its second season of touring the country. It is being presented to engineering societies and management groups as an educational public service. Tracing the history and development of linear measure standards, techniques and instruments, it demonstrates the importance of measurement as applied to our constantly improved standard of living. (DoAll Co., Des Plaines, Ill.)



Left—Man's first standard of measurement, the "Royal Cubit," was based on the length of the Pharaoh's forearm and divided into units based on the width of fingers and palms.

its working LIFE!





steel in ACE drill bushings... that makes the difference!

When working life is doubled... bushing costs are cut in half! Fewer bushing changeovers add bonus production savings! That's why ACE drill bushings of new high-carbon chromium steel are being specified exclusively by cost-conscious tool men everywhere! Make a working comparison NOW with any other make bushing... and see "Positive Proof" that the steel makes the difference!

Write for the all new 1957 ACE Catalog D-3 and the name of your nearest distributor.



ACE DEILL MISHING GO, INC.
SAUT FOUNTAIN MIL, LOS ANGEZIE, CALIF.
ACE DIRLL BUSHING CO INTERE MIC.
611 MCCARTER HAW, REMARK S, N. J.

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Right—Viewers are encouraged to handle and operate the modern precision measuring instruments displayed on the tables.



PRESENTS AWARD. Edward H. Anson (left), president of the American Institute of Consulting Engineers, presented its Award of Merit to Donald A. Quarles, deputy secretary of defense, at their annual dinner on October 15, at the Waldorf-Astoria Hotel, New York City.



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MANUFACTURING CO. 1520 GALLOWAY • EAU CLAIRE, WIS.



 Write today for literature an complete line of Huppert furnaces and ovens in floor and bench models.

 Ask for Hints on Heat Treating.

For Heat Treating Small Parts

-HUPPERT-

DeLuxe ELECTRIC FURNACES

Here's a series of compact, durable furnaces that are ideal for tool and die shops and small laboratories. Any desired temperature within the range of 300° to 1900° F. is controlled by

an accurate, built-in Huppert temperature controller. All-steel construction—multi-insulation—sturdy Kanthal elements—counterweighted doors—removable porcelain tray.

Model	Inside Dimensions			Temp. Range		Watts	Price
No.	Wide	High	Deep	remp. Kun	,.	110 Volts AC	71100
434DL	41/4"	35/4"	43/4"	300°-1600°	F.	920	\$ 90.00
439DL	41/4"	35/8"	9"	300°-1600°	F.	1650	120.00
436DL	45/2"	33/4"	6"	300°-1900°	P:	1650	130.00
5DL	45/6"	33/4"	9"	300°-1900°	F.	1750	176.00
9DL	6"	6"	6"	300°-1900°	F.	2200	200.00
669DL	6"	6"	9"	300°-1900°	F.	3000	248.00
10DL	8"	4"	6"	300°-1900°	F.	2000	220.00
849DL	8"	4"	9"	300°-1900°	F.	3000	265.00

Available for 220 Volt AC at small additional cast.

Stainless steel housing slightly higher.

K. H. HUPPERT CO.

6845 COTTAGE GROVE AVENUE, CHICAGO 37, ILLINOIS

Manufacturers of Electric Furnaces and Ovens

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Appointments and Promotions

Changes in Executive and Production Personnel

Name	Company	To	Position
John von Rosen	Chrysler Corp. Detroit, Mich.	Same	Dir. Mfg. Engry.
John J. McDermott	Babcock & Wilcox Co. Barberton, O.	Same	Production Manager

Changes in Sales and Service Personnel

Name	Company	То	Position
Joseph A. Boothroyd	Westinghouse Electric Co.	George S. Maier Co. Ridley Pk., Pa.	Sales Representative
Walter E. Regers	Taft-Peirce Mfg. Cu. Woonsocket, R.I.	Has requested temperary imactive status due to lilne	41
David M. Gaskill	Brush Electronis Co. Cleveland, O.	Airborne Instr. Lab. Mineola, N.Y.	Manager, Industrial Sales
C. F. Duff	Morse Twist Drill & Mach. Co. Chicago, III.	New Bedford, Mass.	National Sales Mgr.
J. James Brown	Morse Twist Drill & Mash. Co. New Bedfurd, Mass.	Chicago, III.	Midwest District Mgr.

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SURFACE PLATES -ANGLES-STRAIGHT EDGES

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COMPANY Barelay St., Milwaukee 4,

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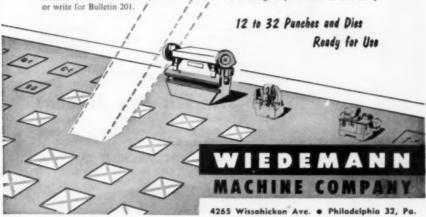
CONCENTRIC TOOL CORP., 2486 Huntington Dr., San Marino, Calif.



Exaggeration? Not if the experience of Wiedemann users is any criterion.

Wiedemann Turret Punch Presses produce more work in less time and in less space. In numerous plants, one Wiedemann has replaced as many ay 12 or 14 units such as single purpose punch presses, layout tables, nibbling machines, etc. And in most cases, the single Wiedemann, in 1/10 the floor space, actually out-produces the multiplicity of conventional equipment. Direct savings of 60% to 90% are commonplace. Machine down-time is practically eliminated; accuracy is improved; valuable floor space is freed; engineering changes become low cost operations...

If you are interested in greater productivity of pierced parts in small to semiproduction quantities, such as panels, chassis, truck parts, etc., it will pay you to get the facts about Wiedemann Turret Punch Presses. Send drawings of your work for time study





New Cutting Oils for Tough Alloys

Habcool No. 318 tapping oil was developed to allow metalworking plants to machine the tough alloys on a production basis.

This oil, the H & B Petroleum Co. reports, was used to solve the many machining problems involved in building the first atomic submarine. According to the manufacturer it reduces rejects 95 percent, increases tool life, improves finishes and holds size.

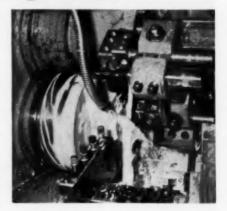
Although this product was designed as a threading oil, machinists report that it can be used with equal success in all machining operations. If used as a cutting oil base and reduced in body by adding inexpensive blending oil, it becomes a flexible product for pumping operations.

A similar, but emulsifying product, Habcool 312XX, was developed to meet a demand for a water soluble oil capable of withstanding terrific speeds, feeds and pressures developed by the modern chuckers, turret lathes, millers and drill presses in machining the tough alloys.

The manufacturer points out that the most difficult production machining operations can be economically accomplished using a combination of Habcool 312XX and 318. With 312XX in the reservoir of the machine, No. 318 may be brushed on for difficult tapping or chasing operations. The 312XX will readily emulsify the No. 318 that drains into the reservoir.

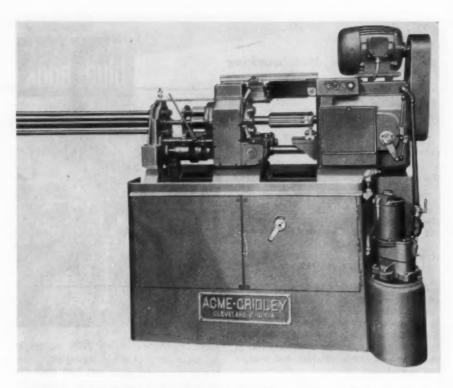
H & B Petroleum Co., 791 E. 25th St., Paterson 4, N.J.

Use postpaid card, Circle No. 81



ABOVE: Manufacturer reports 300% increase in tool life by user when drilling, reaming and contour turning aircraft fittings of AMS 5648 steel with 312XX. BELOW: Mixture of 1/3 No. 318 and 2/3 blending oil, when boring same material, resulted in tenfold increase in tool life, manufacturer reports.





7/16" Six-Spindle Automatic

Developed especially for making small parts in mass-production quantities, National Acme's newest, fastest, and smallest Acme-Gridley 6-spindle bar automatic, the 7/16" RA-6, features spindle speeds up to 5000 rpm. Even when equipped with spindle stopping mechanisms, spindle speeds of up to 3600 rpm. can be obtained.

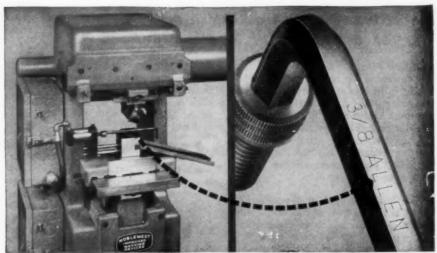
Notwithstanding its small size (approximately 5 feet high, 5½ ft. long—16 ft. including a stock reel) the machine embodies all the advantages and basic design features of the larger members of the Acme-Gridley family.

For example, it offers ample room

for adjustment and tool changes in an "open" tooling zone and will accommodate among special tooling applications secondary operation attachments for threading, reaming, pickup and back burr, milling, cross drilling and cross tapping.

Production of the new machine is being accelerated and paced to meet the increasing demand for a compact, high-speed automatic offering all the advantages of circumferential automation proved by larger units in the line.

The National Acme Co., 170 East 131st St., Cleveland 8, Ohio.



Roll Marks manufacturer's identification permanently.

HIGH PRODUCTION MARKING

WITH NEW Cyclomatic CONTROL

This general purpose marking machine combines the original NOBLEWEST Roll Marking process with CYCLOMATIC CONTROL... an exclusive NOBLEWEST electro-pneumatic circuit for completely automatic cycling. When set for automatic operation the machine cycles continuously with no further attention required from the operator. A dual control system also provides for semi-automatic operation or for short production runs. This model can also be equipped with an air ejection system (see above) plus an automatic hopper or dial feed. The basic Model 50P1 features a low price, plus quick delivery! For additional details on how NOBLEWEST Marking Machines, tools and dies can lower your production costs, write for new catalog. The Noble & Westbrook Manufacturing Company, 9 Westbrook Street, East Hartford 8, Conn.





Selective Flame Heating Machine Serves a Variety of Applications

A new Flamatic selective flame heating machine embodies the "building block" principle of construction to provide flexibility for a variety of flame heating applications. These machines are designed primarily for heat processing applications requiring high or low heating capacity, selective application of heat, precise temperature control and automatic operation.

The basic element of the new Flamatic is a base unit of functional, flatbed design which acts as the supporting member for a wide variety of work-holding and handling fixtures and flame heads. The base houses a large volume quench tank with high-capacity heat exchanger, automatic quench agitation system and a large work removal conveyor which can be timed to work continuously or intermittently with each heating cycle, permitting delivery to be integrated with plant conveyor systems.

The rear portion of the base houses a mechanical controls compartment for work-handling fixtures. The upper portion of the base is provided with mounting surfaces for work-holding fixtures and flame heads. Push button controls for all machine functions are conveniently located on a control panel on the front of the base.

A control unit, housed in a separate cabinet, provides control of gas, oxygen, air and water. Fuel gases employed may



Flamatic selective flame heating machine—high or low heat, precise control, automatic operation.

be acetylene, butane, propane, natural or manufactured gas.

A separate rotating spindle work unit is available to simplify the processing of the large volume of gears, pinions, shafts, cams and other parts that are best handled by rotating them during the heating cycle. Spindle speeds are infinitely variable from 15 to 375 rpm. Automatic spindle retraction of 10 inches maximum at end of heating cycle in-

stantly drops the workpiece into the quench tank below.

Rhomboid type flame heads with removable tips are normally employed in conjunction with the rotating spindle work unit. Flame heads are carried in a universal type mount embodying three swivel movements, simplifying the positioning to any desired angular relationship with the work. To facilitate loading, flame heads are mounted on



The Wells 49A is a dual-purpose machine designed for shop or "job-site" work. As a horizontal cut-off saw, the 49A has a capacity of $3\frac{1}{2}$ " x 6". Swing the head to vertical position . . . it's an upright band saw. No tools required! Use it for cutting angles, slots, notches, bevels and light contour work.

The 49A can save time and money for you. Let your local Wells Distributor show you how... or write direct for complete information.



The Pioneers of Horizontal
METAL CUTTING
BAND SAWS
WELLS MANUFACTURING CORPORATION

707 COOLIDGE AVE. THREE RIVERS, MICH.

pneumatically actuated sliding mounts having 4" retraction for each head.

For many types of work, an important feature is the accurate electronic temperature control which automatically terminates the heating cycle and causes the workpiece to be dropped into the quench tank when its surface temperature reaches the desired preset

value. The "brain" which directs this accurate control of temperature is a remotely mounted electronic radiation pyrometer embodying a sensing element which accurately measures the surface radiation of the workpiece.

Process Machinery Div., Cincinnati Milling Machine Co., Cincinnati 9, O.



Pub. No. 823



Pub. No. 824

Including

- Universal Right Angle Irons
- Pattern Makers Angle Plates
- Straight Edges
 Parallel Straight Edges
- Height Blocks Tooling Angles
- Magnesium Scribers

Here's all the stability and accuracy of fine precision equipment in an extremely lightweight, portable form. 25 to 40% the weight of semi-steel units. Easy to handle . . . easy to carry . . . easy to position. Write for catalogs describing this new addition to the Challenge line or see your local Industrial Distributor for full details.

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THE CHALLENGE MACHINERY CO., GRAND HAVEN, MICH.

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One of these pillow blocks contains a non-expansion or "fixed" bearing unit. The other is an expansion or "floating" bearing. Mix them up-order a "fixed" bearing where conditions dictate an expansion unit-and you are in trouble. Bearing failure in a very short time is almost certain.

One of our customers recently ordered spare bearings for new coal handling equipment and overlooked that important difference. They allowed us to check their survey of bearing requirements against the actual bearings installed on the equipment. We found on many applications "floating" units were required and their order failed to specify this vital point. Savings in time, trouble and money for our customer by this simple check were important.

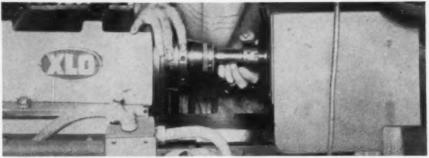
Let us help you survey your bearing requirements-let us check the actual bearings in your equipment and we will be ready with the correct bearings you need when you need them. Call or write our branch nearest you now!

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Because the basic design of the chuck eliminates all clearance and play evenly along the chucking surface and creates a powerful shrink fit on the shank or holder, the tool is held in position with a high degree of accuracy and eliminates any tendency to vibrate or be off-center. With this tool setup, about 300 pieces per tool change are being realized.

Changing the tool is extremely simple with a spare toolholder being used to

minimize machine downtime. Because there is little time lost in tool change, there is no tendency to try to stretch out the time between changes, with the result that off-limits work is virtually eliminated. Carbide tool tip spares are kept at the machine and are replaced in the toolholder body while the machine continues to operate using the other holder.

Scully-Jones & Co., Dept. BB, 1907 S. Rockwell St., Chicago 8, Ill.
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A test in your plant will quickly prove the superiority of this —

CENTER OF CENTERS



PRECISION FRICTION-LESS LIVE CENTERS

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 - Slip-in
 - Slip-over
 - Spindle types



Write for index Circular D

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Wherever special metal-working machinery is purchased, BUHR ECONOMATICS are wellknown for Quality and Performance.

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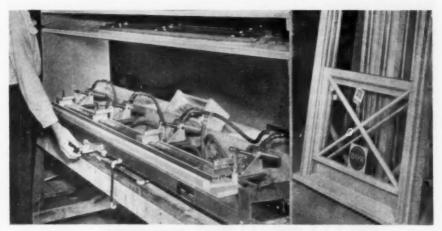
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For nearest Distributor look under "GEARS" in the Yellow Pages of your Telephone Book.



FOUR DE-STA-CO MODEL 810-U CLAMPS (for smaller assembly operations) are used simultaneously to compress a spring-loaded metal channel into the side of a window-sash frame for proper insertion of wood screws. Clamping and unclamping is triggered by valve lever. Finished product and assembled window-sash sides are shown in foreground and background at right. Detroit Stamping Co., Dept. BJ, Detroit, Mich.

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Above is shown a 6M Fen Automatic Wrench operating a 28" heavy duty chuck.

For detailed information regarding the application of the Fen Automatic Wrench to your machines, phone, wire or write.

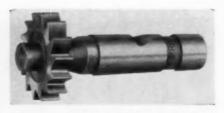
ELIMINATE "WRENCH WRESTLING"

You can put the advantages of the Fen Automatic Wrenches to your work right in your own shop on machines already in operation, or specify them on your new standard or automatic machines.

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Keyseat cutter

The Midwest tapered drive keyseat cutter is said to have more holding power, and concentricity of the cutter results. This is because of the tapered and keyed shank. The shank design is adaptable to high production and hard-to-cut materials. These cutters are stocked in all standard sizes for immediate delivery. Special sizes can also be furnished to customers' requirements



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A marvelous new accessory that snaps over reflector to guard against burning.

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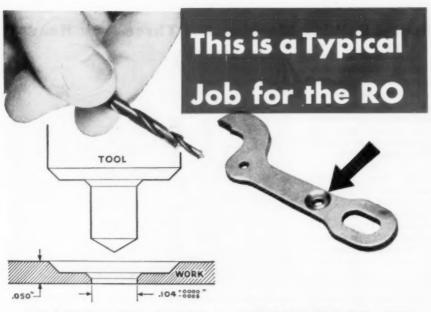
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STANDARD DRILL CONVERTED TO SPECIAL IN LESS THAN 10 MINUTES

The user reports savings on this drill which is used in quantity, to be \$4.50 each when ground on his R-O. The R-O is the most useful and versatile cutting tool sharpener ever invented. It also has many applications other than tool sharpening: i.e., grinding a variety of forms on production parts: cams, squares, hexes, elipses, etc. Write for our catalog.

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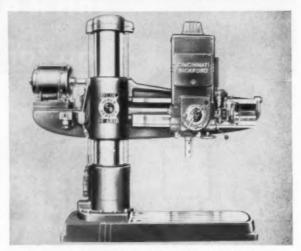
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Radial Drilling Machine has Three New Heads

Super Service radial drilling machine, now being offered with three newly-designed heads. incorporate construction and operating features that permit fast, safe operation and machining accuracy.

The three new optional head designs, with centralized operating controls, include: (1) Standard lever-shift model, which controls all 36 spindle speeds and 18 power feeds manually; (2) partial preselect model, which provides hydraulic control



Drilling machine features lever shift control of all spindle speeds.

When a Machine Tool Can't Do Its Job -Should it be

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In making this important decision, here is one thing to keep in mind:

Repairing, rebuilding and maintaining our customers' machine tools is our only business. We do not sell used machinery. Write for Bulletin 100 or for free estimate.

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A Burkhard-rebuilt machine tool is GUARANTEED to give the same Tolerance, Quantity and Quality of work as when it was new at a fraction of the cost of a new machine!

of all 36 spindle speeds with manual control of the 18 power feeds; (3) complete pre-select model, which hydraulically changes all 36 spindle speeds and 18 power feeds, controlled by two easy-to-read dials which are positioned low and logically located one on each side of the head.

Drilling machine can be easily converted in the field to hydraulic preselect system for control of both spindle speeds and power feeds, or hydraulic

pre-selection of speeds only. De-clutchable Herringbone driving gear provides the necessary power to drive large diameter drills and heavy cutting tools for maximum penetration. For small drills and taps requiring high spindle speeds and quick reversals, the gear is declutched, eliminating excessive velocity.

A pre-loaded, four bearing, chrome nickel spindle and chromium plated spindle sleeve are supported in a

For Hard-to-Light Machines . . . New Adjustable-Arm

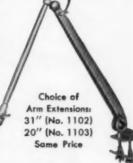
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Dazors

with Side-Mounted Reflectors







Now it's as easy to beam light into a recess, or around an offset, as onto a simple tool or bench position. This Adjustable-Arm Dazor with side-mounted reflector offers same low-cost air-cooled efficiency and positive tension control as top-mounted style. Uses 60-w bulb. Call your Dazor distributor. Dazor Manufacturing Corp. St. Louis 10, Missouri.



... Makers of

DAZOR FLOATING LAMPS

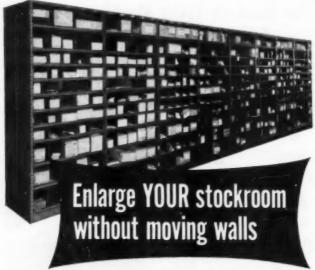
honed head bore over 17 inches long, assuring rigidity regardless of spindle position.

Both arm and column are clamped hydraulically from the operating position. Special separate motors and complicated electrical controls are eliminated.

Head moves swiftly along arm in either direction with power rapid traverse, operated by directional lever which automatically disengages traversing handwheel when traversing under power. A disc type clutch provides safety at any point of head travel on the arm, eliminating the necessity of limit switches.

Drilling machine is available with 13", 15", 17", and 19" diameter columns; four, five, six, seven, and eight-ft. arm lengths; 36 spindle speeds up to 2300 rpm; 18 power feeds from .004" to .125" with 6 positive geared tap leads.

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Balanced Registered

Granite Accuracy

THE HERMAN A STONE COMPANY

FIRST IN GREETE SERFER PLATES -

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Tapping attachment

The Tapmatic "100" is a compact, lightweight tapping attachment, weighing only 10 ounces. It has a max. diameter of 15%" and a max. length of 3½". The rated capacity for tapping in steel is from No. 00-No. 6.



The Tapmatic "100" features a lifetime positive torque control clutch, free axial floating action and instantaneous, planetary ball, reversing mechanism. The human or mechanical "lead error" is eliminated by the free floating action of this unit.

Tapmatic Corp., Dept. KE, 845 West 16th St., Costa Mesa, Calif.

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Would you spend
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Here's a complete line of Balancing Tools which will save their cost quickly on balancing or truing operations. Accurately sensitive and durable, they provide a simple, reliable means for checking the balance of parts like gears, shafts, fly wheels, pulleys, etc. The standard sizes available are shown in capacity chart below.

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	21 in.	20 in.	800 lbs.
	43 in.	29 in,	800 lbs.
	43 in.	29 in.	2,000 lbs.
	6 ft.	5 ft.	5,000 lbs.
	B ft.	8 ft.	10,000 lbs.
	Any	Any	24,000 lbs.
	43 in.	30 in.	800 lbs.

FREE DATA



You can obtain complete informa-tion on Sundstrand Balancing Tools by writing for bulletin 486.



OBI press adapted to horizontal position

What to do with light weight parts that won't eject properly has been solved by adapting the Press-Rite OBI press to a horizontal position.



The standard inclination of an OBI press is sometimes not sufficient to insure clearance of lightweight parts between strokes, according to the manufacturer. In cases like this, the machine can be relatively easily converted at the factory to a horizontal position for positive downward ejection of all parts, regardless of the lightness of the metal.

Sales Service Machine Tool Co., Dept. BB. 2363 University Ave., St. Paul. Minn.

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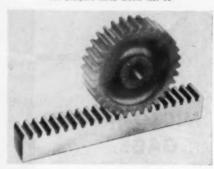
Stock gear racks

New 14½° or 20° pressure angle gear racks in sizes from 3 to 48 diametral pitch are available in six foot lengths.

Racks are used on lathes, marking machines, various presses, etc. Manufacturer also has facilities for making special gear racks to blueprint specifications.

Accurate Gear Works, 3154 W. Grand Ave., Chicago 22, Ill.

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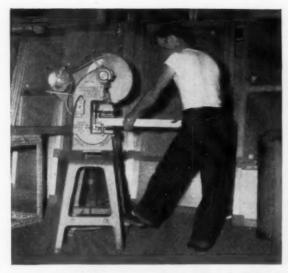
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The combination pipe and conduit gage callibrates sizes of pipe from 1/8" to 11/4", standard pipe sizes. It also has a scale for callibrating by sixteenths the size of all tubing, shafting and other round stock. This can be checked with a high degree of accuracy. The gage is of 1020 carbon steel, of gun metal finish, white filled-in graduations. It may be had free of charge when requested on company letterheads.

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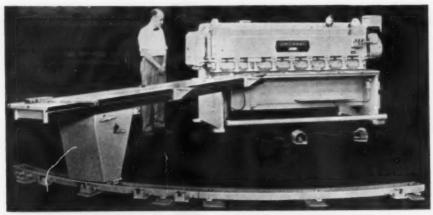
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Time Post by Machine Operator (it \$1.50 per hr.	18.00	3.00
Coolant Compound Used (it \$1.50 per gal.	21.00	4,50
Cost of Wheel prorated weekly	37,50	26.50
Machine downtime @ \$10.00 per hr.	120.00	20.00
Totals	\$208.50	\$66.00
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tolerance of only two minutes. The sheets being sheared will be transformer laminations, varying in length from 734" to 15'. Material is silicon steel, electric grain oriented, 0.012" to 0.014" thick.

The pivot point for the angular shearing gage is in the shear table. The gage support carriage travels on a floormounted track. Movement of the carriage from one to another of the angular gaging positions is rapid and

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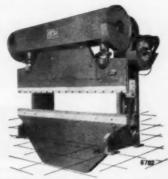
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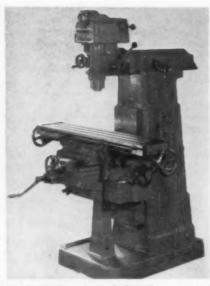
7440 South Loomis Boulevard, Chicago 36, Illinois

Vertical mill

The Rockford vertical mill features an infinitely variable spindle speed drive. The machine also incorporates a rigidly-held rotating head, a vibrationfree quill, positive automatic depth control and other innovations.

The stepless variable speed drive makes it possible to set the spindle speed exactly in accordance with specifications for the job, with the result that tool life is greatly prolonged and the work improved. Any desired speed is obtainable, from 85 to 560 rpm in low range and from 600 to 3,720 rpm in high-speed range. No changing of belts or gears is required in making a spindle speed adjustment. The operator sets the range selector knob in low or high range, watches the built-in tachometer dial, and simply rotates a handwheel control until he has the desired speed.

The head of the mill is rigidly mounted to the ram with three bolts.



By loosening these bolts, the operator can easily swivel the head through 360°



to any desired angle. It is again held in exact right-angle alignment, with no sag between the head and the ram, when the bolts are tightened.

The motor is mounted in the base of the mill, completely eliminating possible transfer of motor shock or vibration to the spindle.

Fenlind Engineering Co., Dept. BB, 5602 Pike Rd., Rockford, Ill.

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Saw blades for cutting stainless steel

The high-speed steel blade is said to have been under test for more than six months for both cutting efficiency and breakage resistance. In addition to stainless steel, testing has demonstrated ability to make limited cuts in materials up to a hardness of 55 Rockwell on the C-scale, it is claimed.

Initially, the new blades are available

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Precision Internal Gage for holes 1/8" to 10" dia.

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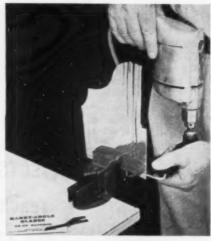
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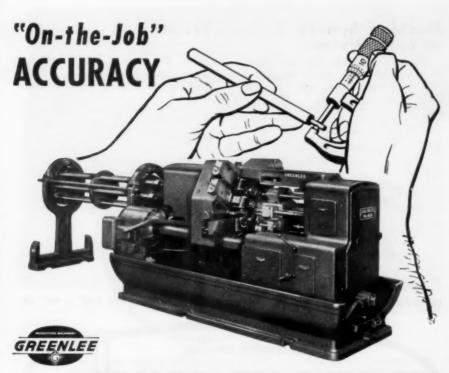
only in limited supply and in the "bayonet" design found best for contour work. Five sizes—with teeth per inch specifications of 10, 14, 18, 24 and 32, and usable cutting length of 15%"—are listed at \$1.10 per blade or \$11.00 per dozen.

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The new LeBlond-Carlstedt Rapid Borer will solid bore, trepan or counterbore long holes faster, says its manu-

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Machine has capacity for holes from



LeBlond-Carlstedt Rapid Borer-solid bores, trepans, or counterbores holes from 5/16" to 41/4" dia.

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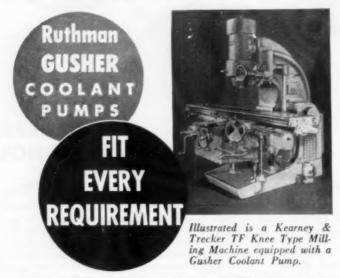
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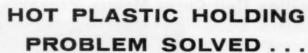
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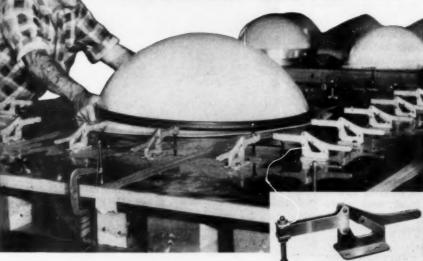
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Chilling Unit Cures Metals, Prevents Warpage

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Cincinnati Sub-Zero chilling machine eliminates austenite in steels.

The machine, Model 3SR 120-47, will be used extensively for the elimination of retained austenite in the new steels being used in the industry in recent years. Rocket and missile steel, for example, must retain hardness and dimensional stability at elevated temperatures.

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minus 120° F. Using convection fluid, it will chill 250 lb. of steel per hour from ambient to minus 120°. For the purposes of faster and more uniform chilling, the chamber is equipped with a Model VH-5, ½ hp convection fluid agitator. The water-cooled refrigeration system has two 5 hp condensing units operating on 440 volts; 60 cycle, three phase, with 110 volt control circuit.

Outside dimensions are: height, 48 inches; length, 180 inches; width, 60

inches. The one-piece cabinet is 14 gauge steel with a 7 gauge steel base. A mullion heater in the cabinet channel cap prevents condensation of moisture and assures dry cabinet exterior. The chilling chamber, electric welded pressuretight, is constructed of 7 gauge steel, hot-dipped zinc coated.

The unit, is suited for use in any type of production chilling operation.

Cincinnati Sub-Zero Products, 3930 Reading Rd., Cincinnati 29, O.

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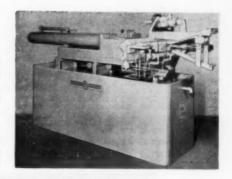
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MACHINE and TOOL BLUE BOOK

Air-powered broaching fixture features automatic loading

All motions in the broaching fixture are operated by air cylinders. Cycle sequencing controls are pilot air valves, with no electrical controls of any type being required to operate the fixture.

The model illustrated broaches ½-in. wide flats on the ends of 5-in. long steel shafts of two different electric rotor assemblies at a production rate





Operators like 'em... because Kent-Owens Machines are extremely simple and practical. Turn out milling jobs fast, with minimum worker fatigue! Twin-post head mounting assures balanced load. Only two gear contacts, motor to cutter, for greater cutting efficiency. Write for bulletins on wide range of single and double spindle hydraulic and hand-operated machines. Also, let Kent-Owens design and build your tooling and special machines. Kent-Owens Machine Co., Toledo, Ohio.

Call on KENT-OWENS

for MILLING MACHINES

of 720 pieces per hour. Fully automatic loading is provided by a magazine feed having three separate air-operating cylinders. Broach advance and return is controlled by a 6-in. dia., 25-in. stroke air-hydraulic cylinder mounted on the end of the fixture.

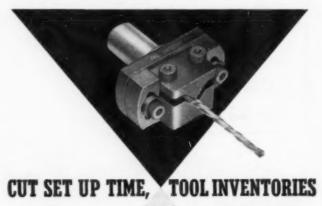
Provision for handling the two different parts (one has a single broached flat and the other has two; one 5/16 in. dia. shaft is longer than the other)

is made by interchangeable clamping jaws, support jaws and broach holders.

National Broach & Machine Co., Dept. BJ, 5600 St. Jean Ave., Detroit 13, Mich. Use postpaid card. Circle No. 97

Plate bending roll

The initial type plate bending roll, Model R3L-R, incorporates the use of totally enclosed worm gears on the adjustment of the rear roll, and cut steel



with Brookfield Tool Holders*

Simple Things Pay Off! The simpler they are, the better they work. What could be simpler than a precision ground V-jaw vise for a tool holder? If you had thought of it first (and we don't know why you didn't) you'd be selling them by the thousands, just as Brookfield now is.

It's so simple, it's perfect. Just slip the tool into the V-jaw, tighten, and you're off and running with perfect alignment. No time-consuming setup adjustments. No costly bushings or collets to stock or make. Brookfields hold drills, reamers or cutters of any size within the range of any model. A new, colorful, informationpacked brochure tells the whole story. It's yours free for the asking!

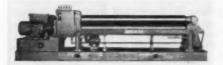
Write, wire, phone

*Patent No. 2472040

West Coast Stocking Distributors Janes Industrial Sales, 910 Geneva St., Glandala 7, Cal.

BROOKFIELD, INCORPORAT

STOUGHTON 1112, MASSACHUSETTS



gears throughout with a train of gears on the main drive. Regardless of the amount of opening for different thickness of plate, the gear teeth are in full mesh at all times.

This machine is built in a range of capacities and sizes from 4' to 10' long, from gauge sizes up to and including 5/16" capacity.

The Webb Corp., Dept. BB, P.O. Box 549, 402 East Broadway, Webb City, Mo. Use postpaid card, Circle No. 98

Grinders do tough jobs

Two new machines-a heavy duty and an extra heavy duty abrasive belt



QUICK ADJUSTMENT . . . done without removing from the machine.

MASTER

NO SCORING . . . synthetic rubber inserts give rubber-to-metal contact.

UNIFORM TENSION ... gives all-over wiped grip with no crimping of thinwall tubing.

SIMPLE CONSTRUC-TION ... only four parts avoids maintenance and insures a long service life.

GREEN FULL FLOATING REAMER HOLDER

FLOATING ALIGNMENT . saves reamer cutting edges by compensating for any misalignment of reamer and drilled hole. Available with either standard or tapered shank.



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MANUFACTURING COMPANY

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Rockton, Illinois



Heavy duty abrasive belt Swingframe grinder.

Swingframe grinder-come in a wide range of power, belt widths and lengths and are claimed to do the tough, difficult grinding jobs quickly and easily. These standard machines also adapt themselves to special applications in combination with other machines.

Grinding and Polishing Machinery Corp., 2530 Winthrop Ave., Indianapolis 5, Ind.

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WRITE FOR FULL DATA-New circular gives complete specifications, shows typical applications.

DIXON AUTOMATIC TOOL, INC. 2386-23rd Avenue

Equipment for Automotic Parts Handling and Assembly



Hardened and Ground Tool Holder Bushings

These new tool holder bushings are hardened and ground and priced lower than conventional soft bushings. Most sizes in stock for prompt delivery. 34" to 31/2" O.D .any bore. Send for descriptive literature.



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100 Blackhawk Blvd. . Beloit, Wis. MANUFACTURERS OF PUNCHES. SHEARS AND BENDING ROLLS.

ALLIGATOR SHEARS

These are high speed shears de-signed for heavy duty. Frames, duty. Frames, levers and eccen-tric shafts are solid steel castings. Can be furnished with gear keyed to ec-



gear keyed to se-centric shaft for centinuous opera-tion, or with foot lever clutch shifter. Can be mounted on logs or structural base. WRITE FOR COMPLETE DETAILS

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New Roto-Pin type lock is inte-gral part of all Pannier Supreme Holders...eliminates loose, bent, dropped, or lost pins . . flip it open to change type . . flip it back to securely lock type in clear-marking position.

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SUPREME HOLDER WITH ROTO-PIN LOCK

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of styles.

of styles.
Machined from HighGrade Bar Tool Steel.
Hardened anvil maintains type alignment.
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December, 1957

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Workpiece pulled down, will not lift. Faster and more secure clamping.

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Various Types: For Milling and Drilling Machines; also Quick Clamping Vise With & Without Swivel Highest Precision Toolmakers'

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Write for latest folder and hack saw selector today.

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H. K. PORTER COMPANY, INC.

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Splining attachment for keyseater

A new splining attachment for the Morrison 1" keyseater is jig bored for accuracy. Consists of a master jig bored plate, taper pinned in two places and bolted to table top. The work is held in a rotary fixture which, with its plunger, indexes any number of splines or keyways.

Attachment can be stored and then relocated accurately on the machine by the use of the two taper pins. Hardened steel rollers back up the cutter bar both above and below the cut, eliminating taper in the work. On the up stroke table backs away .040", giving complete relief to the cutter.

The D. C. Morrison Co., P.O. Box 1017-C, Cincinnati 1, O.

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Splining attachment—jig bored for accuracy.

MINIATURE DRILL BUSHINGS

Hole Sizes—No. 80 to 3/32"
O.D. 3/32" to 13/64"
Lengths 1/4" to 3/4"
.0002 Tolerance on I.D.
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Specially designed hydraulic press

The Elmes Hydrolair is a small pumpless and motorless hydraulic press for plastics molding, laminating, compacting, etc. Unit is economical to operate, since it takes its power from the regular shop air-line.

Standard models meet production requirements of most small-press users. To meet special requirements, "custom-designed" units like the one shown here have been introduced.

The platen on standard models is the



Elmes Hydrolair-50-ton pressure capacity.

JIG BORING

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Large Precision Machining Done to your specifications WE HAVE 21 JIG BORERS

KIDDE PRECISION TOOL CORP.
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THE BEST

PORTABLE

ELEVATING TABLE

(Eliminates Cranking)



*2000 LBS. OR 1000 LBS. CAPACITIES
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A precision made MIDWEST TABLE Costs no more!

- It's hydraulic . . . positions work or feeds at desired height without use of hands
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MIDWEST

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"moving-up" type. The specially built unit illustrated, however, has a moving-down platen specifically designed for an assembly operation wherein manual controls operate the pressing platen and a foot switch is installed for actuating an unloading mechanism. Also, the housing containing the controls has been extended to permit mounting a loading and unloading table at the same level as the press bed.

This press is manually operated, with a 50-ton pressure capacity. For power it utilizes a shop-air pressure from approximately 80 to 90 psi. The air-oil reservoir, air-hydraulic intensifier, the hydraulic cylinders, and practically the entire hydraulic circuit are enclosed in the base cabinet for protection. Simple removal of a cover plate permits easy maintenance inspection of the operating system.

Standard units are available in 30, 50, 75 and 100 ton models, with manual control, with or without hot plates. The 50-ton model is also available with electric pushbutton control. These presses are used for plastics and rubber molding, laminating, compacting, assembly, forming, gluing, and for laboratory test work.

American Steel Foundries, Elmes Eng. Div., 1150-H Tennessee Ave., Cincinnati 29, Ohio.

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VERO MAMMER
SIE**CT

Designed to hold 3 to 6 lb. lead hammer heads more firmly — will not alip — heaps hammer head in shape langer — makes remaiding easier, quicker, surer, less expen-

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LAWRENCE H. COOK, INC.

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SAVE MONEY SETTING UP

Save money setting up, no more time wasting bolts and clamps, a positive magnetic positioning in a flash.

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ADJUSTABLE LINKS

For descriptive literature and address of sales agent in your area write to—

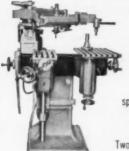
JAMES NEILL & CO. (U.S.A.) LTD.

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MAZ

ALEXANDER die sinkers for 2 or 3 dimensional work



Latest model, No. 3A for molds and dies up to 1000 lbs. Ratios from 1.5:1 to 10:1. 14 spindle speeds from 475 to 9500 rpm. cutters up to 3/8" dia. Two smaller sizes. 1A and 2A

Write for Catalog A on these quality, British machines.

J. Arthur Deakin & Son 150-28 HILLSIDE AVE., JAMAICA 32, N. Y.

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The Dearborn AUTOMATIC INDEXER . . .



connected to a Dearborn chucking fixture does all except put the piece in the collet.

THE CHUCK

is closed automatically

is indexed automatically

is opened automatically

THE PIECE

is knocked out automatically

The Dearborn fixture can also be supplied with degree indexing which permits indexing of any odd angle or combination of two odd angles.

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Machines Demonstrated at Pa. Dealer's Showroom

Delaware Valley Machinery, Inc., Willow Grove, Pa., held a machine tool exhibition Oct. 8-12 at the company's

"Oh, I'm glad you brought up the question of this year's Christmas bonuses, Kowalski. Do you prefer king-size or regulars?" showroom. All equipment was under power and working. Thirty-four machines were demonstrated on workpieces and most machines were operated under full load.

The Fosdick No. 54P automatic positioning jig borer was in operation demonstrating direct dialing of dimension, as well as preselecting and automatic changing of feeds and speeds.

A 16" x 78" centers heavy duty Le-Blond engine lathe demonstrated carbide roughing cuts and ceramic fine finishing cuts being operated at 2800 surface ft. on a tracer application.

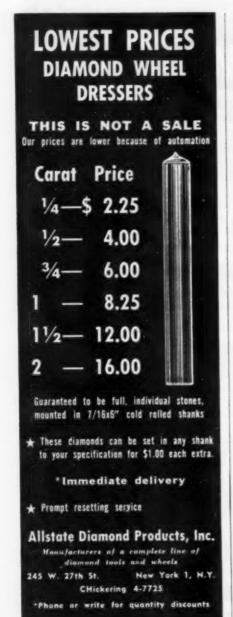
A Mattison vertical spindle rotary table grinder showed automatic cycling and automatic sizing to a present dimension.

The three dimensional tracing unit of a Famco turret type milling machine





View of Belaware Valley Machinery showroom during recent exhibition.



Use postpaid card. Circle No. 419

transferred a shape from a master to a workpiece within very close tolerances.

A Minster OBI press with the clutch mounted in the main drive gear was demonstrated illustrating the overload protection inherent in the clutch design.

V-block parallels developed in builder's tool room

Solid V-block parallels were developed at the Union Mfg. Co., New Britain, Conn., for use in their tool room to take the place of regular ground parallels in some operations. Strapping down and regrinding to make matched pairs is eliminated by having the parallels integral and at an angle. They cannot tip over and they are inseparable.

The original design was improved by adding a flange at one side for greater stability. This was used for securing workpieces to the parallels, or in some cases clamping parallels to machine tables. It was soon discovered that the men were not only laying out work, but drilling, tapping, and milling the workpiece without removing it from the V parallel. This insured perfect alignment and saved hours of time ordinarily required to realign work on the drill presses and millers prior to machining. It was decided to market this unit, and it has been received enthusiastically by the industry.

The company is now introducing a

CAM MILLING

Fully equipped modern machine shop with extensive Jig Boring, Surface Grinding, Horizontal Boring and Thread Grinding facilities as well as modern Cam Milling and Cam Grinding equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC. 23-22 40th Road Long Island City 1, N. Y.

smaller and larger unit to accompany the original V-1. The V-0 is smaller and the V-2 is larger. All sizes are ground parallel top to bottom to within .001". They can easily be reground or ground in sets if desired.

The V-0 block parallel is 15%" high x 51%" across the V with a flange width of 434". The V-1 block parallel is 3" high, 6½" across the V and flange is 534" wide. The V-2 is 3½" high, 9%" across the V and the flange width is 734". Weights are 4, 834, and 21 lb. respectively.

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Drill press vise with push-pull action

A drill press vise designed to combine rapid action with unlimited takeup has no moving parts to fail or sharp edges to cause thread wear. Loading and unloading time is cut 75% and this represents cost reductions on produc-



tion run jobs.

The new drill press vise is $4\frac{1}{2}$ " wide, has a solid base, and can be turned on edge for accurate 90° drilling. The ends of the base are cut back, and the sides of the vise are machined to form a true right angle with drill press tables. There is the advantage also of low over-all height and max. working depth. The vise is only $2\frac{3}{4}$ " high, but has a full $1\frac{3}{4}$ " jaw depth.

Wilton Tool Mfg. Co., Inc., Dept. BB, 9525 W. Irving Park Rd., Schiller Park,

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FLANGING MACHINES

No. 1 10 gauge capacity combination eirele shear and flanger; from 14" to 6' diameter flat with support; 12" diameter less support.

No. 3 %" capacity flank heads from 18" to 12'.

No. 7 % capacity for flanging flat heads. Dished heads with knuckle radii up to

No. 5 $\frac{1}{2}$ capacity flanging flat heads 24" to 20'; also handles dished heads up to 12' dia.

No. 6 % capacity for flanging flat heads 24" to 20'; also handles dished heads up



Above machine a No. 4-% capacity. With 1/4 head, 8' diameter, Will flange fiat heads from 20" to 12 ft. in all thicknesses up to and including % boiler plats. Dished head attachments can be furnished with this model.

No. 53 Elliptical Head Shear and Flanging Machine which operates from the same controls. Head is sheared to size and shape before flanging from same template without removing work from the machine.

BLUE VALLEY MACHINE & MFG. CO.

THE HELIOS

With Autometic Thumb Lock . . . With all inch Scales or one Inch and one Metric Scale.

\$9.90

The 55 A with set screw lock with one Inch and one Metric scale or all Inch scales:

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Also available . . .

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6" SCALE HARDENED Guaranteed Accuracy within .001" Double Length



Continuous pilot counterbores

Fastcut continuous pilot counterbores are now available in sizes for U.S.S. cap screws No. 6 up to %". They are made of high speed tool steel, heat treated for maximum wear resistance. Concentricity between the pilot and cutter body is held extremely close by grinding the entire tool form on centers.

As the tool wears, the cutter body may be re-sharpened many times. The pilot length may be cut off as required.

Fastcut Tool Co., 7405 E. Davison, Detroit 12, Mich.

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Counterbore may be re-sharpened as it wears.

ECONOMY

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"A Name to Remember

—whenever your duplication requirements call for the standard tool items illustrated here. Stocks at ECONOMY are always complete—assuring you of quality and service.



A.S.A. Standards & Extended Range Bushings

Descriptive Bulletins, Prices, and Dimensional Data Sheet No. 7-A upon request. Ask for prices on salvaging worn-out plug and ring gages.

ECONOMY TOOL & MACHINE CO.

1829 South 68th Street Milwaukee 14, Wisconsin

Hardness Testing Unit Solves Difficult Inspection Problem

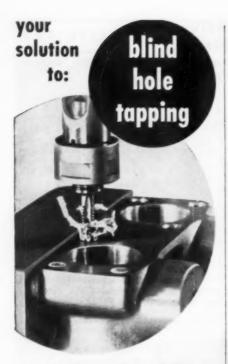
A difficult inspection operation at Edo Corp., College Point, N.Y., was made easy through the utilization of a Wilson Universal Rockwell hardness testing unit. It is a standard tester which is mounted on a rigid frame—designed and constructed by the user.

"In our quality control department," says George A. Ferenz, manager, "we must obtain accurate hardness readings of large components that are approximately 30 inches in diameter, 6 to 8 feet



Universal Rockwell hardness tester, when equipped with plunger rod extensions, can be used as shown to check the hardness of deeply recessed work areas.





. . . tap-cartridges

provide clean, chip-free, tapped blind holes. CARTRIDGE TAPPING . . . consists of tapping into TAP-CARTRIDGE which has been introduced into the drilled hole. It obtains smoother, more nearly perfect formed, and uniform threads to the very bottom of a hole in any material. The newer materials, such as magnesium and plastics are easily tapped in one rapid and uniformly successful operation.

. . . saves time, labor and money. Tap life is increased three, five, even ten times with definite reduction in scrap, and improvement in production and product.

. . . replaces COOLANTS and LUBRICANTS with clean, dry TAP-CARTRIDGES.

A quantity sufficient for trial on your most difficult operations will be furnished without cost or obligation.

CARTRIDGE 2020 THOMAS ST.

CO. HOLLYWOOD. FLA.
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long and having numerous bosses and lugs welded to the outside surface. These additions to the structure are heat-treated before they are welded and are checked after attachment to make certain that the heat treated hardness was not affected by the welding process."

Prior to the purchase of the Universal, a product of the Wilson Mechanical Instrument Div., American Chain & Cable Co., Inc., Bridgeport 2, Conn., attempts were made to check the hardness with portable testers. However, due to the many inaccessible areas to be checked, the portable units were not practical. The Wilson tester is claimed to have been the only instrument entirely suitable for the difficult testing requirement.



NEW BRITAIN SWIVEL VISE



The body is made of semi-steel; the jaws of tool steel hardened and ground. All working surfaces are ground. The vise is as accurate as is possible and the degrees are cut to very close limits.

Write for further information

NEW BRITAIN TOOL & MFG. CO.

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Outfits include from 80 to 154 pieces of type—plus a holder made from non-spalling, non-mushrooming Mecco Safety steel. Write for Bulletin UT.

SAFETY UTILITY MARKING OUTFIT

A product of the Marking Device Industry

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economically priced press room equipment



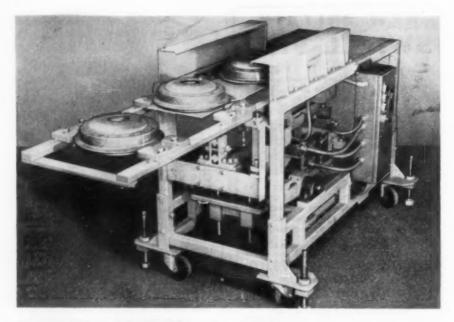
DURANT Ram Scrap Choppers

Operated by press ram, independent of the die. Tool steel blades. Easily installed in any position only two bolts necessary.

Maximum Stock			
Model	Width	Thickness	Price
M I	3"	.062	69.
M 2	6"	.062	95.
M 3	10"	.100	165.
M 4	12"	.100	195.
M 5	16"	.100	250.

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DURANT TOOL SUPPLY CO. PROVIDENCE 3, RHODE ISLAND



Transfer Unit Feeds and Unloads Stampings

For handling stampings in pressrooms, this portable, plug-in automation package unit can be adapted to handle a variety and size of stampings. The unit can be used to load and unload one press or it can be placed in a line of presses with a continuous transfer bar

to provide a completely automated transfer line.

In operation, a stamping to be fedinto the press dies is placed in a preload station on the feeder. Fingers on the transfer bar pick up the part as the bar is lifted and deposit it in an



intermediate station as the part is carried forward and lowered by the liftand-carry mechanism. The number of intermediate stations in the feeder unit depends on the press spacing. On the next sequence of the transfer bar, the stamping is lifted from the intermediate position, advanced and lowered into the die over gage pins. When the press has completed its cycle, unloading fingers on the transfer bar pick up the finished stamping and advance it to the next operation while another part is being loaded into the die.

Press Automation Systems, Inc., Dept. BJ, 25418 Ryan Rd., Centerline, Mich.
Use pestpaid card. Circle No. 107

Truing ring set for boring chuck jaws

The Repco 48-piece truing ring set serves to eliminate wasted time that occurs in locating or machining the proper sizes of stock. For use in boring



ABART GEAR and MACHINE CO.

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December, 1957

FLYNN BORING HEADS



LEADING NAME IN
BORING HEADS FOR 40 YEARS
19 MODELS Write for catalog
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Machine Surfaces and Profiles



- Accommodates wide variety of precision work within a range of 8" x 11%"
- Accurate to within ± 0.0005" within 6"
- Changes strokes by switch control to either 60 or 120 min.

EXCLUSIVE TERRITORIES OPEN



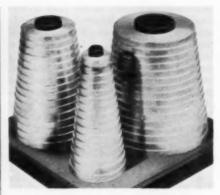
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Jersey manufacturing co.

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soft chuck jaws to size, it makes available the correct diameter rings. The complete set of rings include sizes from 1" to 4" O.D. in 1/16" increments.

The set also serves to increase chuck jaw life by eliminating the tendency of operators to bore excess material from

"DAVIS" KEYSEATERS



Built in 3 sizes for cutting keyways 1/16" to 1" width. Circular upon request.

DAVIS KEYSEATER CO.

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Send for new catalog sheets on our complete line, which include charts and instructions om figuring clearances.

Using the right tools for the specific work will enable you to get the full benefit of the exceptional durability of

Lewthwaite

Punches & Dies



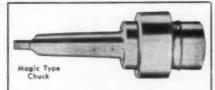
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MACHINE and TOOL BLUE BOOK

chuck jaws because they lack proper diameter ring. Use of a proper size truing ring also permits taking up all back-lash in master chuck jaw screws and, through the application of even pressure, assures accurate size boring of jaws to meet workpiece specifications.

Rockford Engineered Products Co., Dept. BB. 2324 - 23rd Ave., Rockford, 111.

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THE COLLIS MAGIC-TYPE **CHUCKS**

Reduce production costs with Collis Magic Chucks. Now tools can be changed without stopping or slowing down the spindle. Boring, counter boring, drilling, reaming, tapping, etc., can be performed practically continuously.

Let our 40 years of manufacturing experience help your customers select the proper equipment for the job.

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THE COLLIS CO. Dept. A. Clinton, lowa

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Solid Stock cold cut... Tubes, Pipes Sections

of Steel, Non-Ferrous Metals, etc. accurately-economically on



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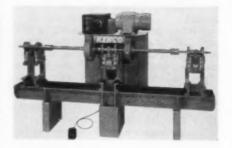
ALWIN FR. WILKENS, INC. 55-02 37th Avenue Woodside 77, New York

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Triple punch press

This punch press unit consists of three 5-ton punch presses mounted on a rugged frame. Crankshaft and rams operate synchronously. The drive engages the crankshaft at a central point, eliminating differences in torsional twist. There are three bolster beds planed parallel to within ± .002 inch for perfect alignment of the die set. This unit employs a high torque, high





slip motor, which is connected direct in order to eliminate clutching mechanism, and permit a central drive.

This press is used to punch and form door jambs, window slides, and window frames. In many cases, as many as five operations may be grouped into a single operation. For example, where formerly it required 3 minutes to make one door jamb, this equipment now produces 15 jambs per minute.

Kenco Mfg. Co., Dept. KE, 5211 Telegraph Rd., Los Angeles, Calif.

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Self-locking ball plungers

Ball plungers, widely used in indexing, locating and position applications, are now fitted with Nylok, a feature that keeps them positioned without checknuts, staking, or other bulky secondary locking devices.

Each plunger is permanently fitted with this tough Nylok pellet which slightly protrudes above the major thread diameter. As the plunger is inserted into a tapped hole the pellet is compressed, exerting a spring-like





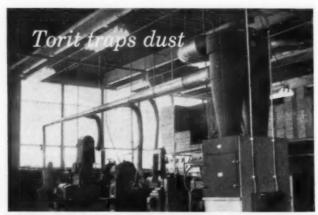
pressure on one side of the body which wedges the mating threads together.

Vlier Engineering, Inc., Dept. KE, 8900 Santa Monica Blvd., Los Angeles 46, Calif.

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Carbide reamers

The design of the line of straight shank carbide chucking reamers features solid carbide flute section instead of the usual carbide tipped flutes. The



Six machines protected from dust by Torit for \$666 15

This Torit Dust Collector, Model 219FM, complete with accessories, was installed by the Mohr Lino Saw Co., Skokie, Ill., to protect 3 belt sanders and 3 other grinders (2 grinders hidden from view) from destructive dust—at a total cost of just \$666.15!

After one year's operation, Mohr Lino Saw says this about their low-cost Torit installation: "The Torit installation has kept our shop cleaner, our operators happy, and protected vital machinery."

You too can achieve greater machine protection and cleaner working conditions by trapping dangerous or valuable dust at its source with a completely self contained and portable Torit Dust Collector. For full details write to:

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Dept. 603, 311 Walnut Street, St. Paul 2, Minn.



advantages are much greater rigidity with consequently reduced chatter, longer productive life between grinds and less chance of breakage. Decimal sizes, 230" to .760"; fractional sizes, ½" to ¾".

Van Norman Industries, Inc., Dept. BJ, 21650 Hoover Rd., Detroit 13, Mich. Use postpaid eard. Circle No. III

Big Beulah moves loads to 2500 lb.

The Big Beulah die handling table, recently added to the Portelvator line, is able to roll and turn, lift and lower, push and pull. It lifts loads up to 2500 lb., transports them and slides them to another surface without manual strain or risk of damage to either load or man.

Table is especially recommended for



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MAC-IT hex socket SCREWS

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Newest die handling table in Pertelvator line.

transporting dies from storage to press, but may also be used for a wide variety of lifting, moving, and maintenance work.

Reinforced top-plate has an area of 748 sq. in. (22" x 34") and is fitted with eight recessed, free rolling conveyor rollers for ease in moving loads. A ram, impelled by a screw-and-nut device, travels the length of the top-plate, pushing loads from table to press



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403 N. Ashland, Chicago 22, 111.
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MACHINE and TOOL BLUE BOOK

or storage shelf, and pulling loads from press or storage shelf to table.

Vertical movement of top-plate is 25 inches—from 35" min. to 60" max. above floor level.

The Hamilton Tool Co., Ninth St. at Hanover, Hamilton, O.

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Tool rest for grinder has 180° positioning

The ability to position tools at extremely small angles or great angles while sharpening is a feature of the



Angle-Set mitre gage. Simply constructed for use on tilt tables of carbide tool grinders, the tool rest is resettable in four assembled combinations to give a complete 180° selection of tool rest positions as indicated on the calibrated 90° sector dial. Adjustable compression springs hold the movable face plate in position either toward or away from the wheel face.

Diamond Tool Co., Dept. BJ, Box 32, South Haven, Mich.

Use postpaid card. Circle No. 113

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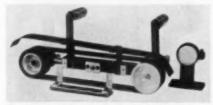
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Phone Diamond 3-0411 Use postpaid card. Circle No. 448

Belt grinder combines portability, high speed

Fast operation with reduced operator fatigue is offered in the Model 2-42 abrasive belt grinder. Designed for portable or fixed bench mounting, the unit will handle any grade grit of aluminum oxide or silicon carbide abrasive in two inch wide belts.

Used as a portable hand unit, the flexibility of the belt permits grinding of convex or flat surfaces. A belt sup-



Abrasive Machinery's abrasive belt grinder.

port accessory may be attached to give added rigidity to the belt on flat grinding.

The handles may be reversed for over or under the work grinding or for right or left hand operation. Six different handle adjustment combinations can be made.

Frame is cast aluminum alloy. The grinder is powered with a 11/2 hp air motor which gives the belt a surface speed of 6000 fpm. The unit weighs 9 pounds 4 ounces.

The cutting edges of the grit are above and free from the bond. Belt loading is practically eliminated when the proper grit and abrasive for the metal being worked is used.

Abrasive Machinery Corp., Dept. 290. 444 S. Pennsylvania St., Indianapolis 4. Ind.

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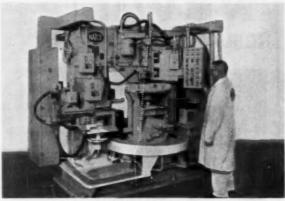
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Special Machine Processes Bearing Housings

Twenty-five different bearing housings for electric motors can be drilled and tapped on a new Natco automatic sequence machine. Frame sizes range from NEMA frame 182 through 326, both open and enclosed motors and front and rear housings.

The housing is loaded in a horizontal position with open end up. For enclosed motors only, two grease holes are drilled and tapped on the rear housing in the

horizontal plane. For open motors only, three holes are drilled and tapped in To accommodate the different sizes



Natco automatic sequence machine—drills and taps 25 housings.

air deflector.

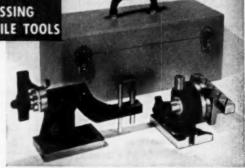
the vertical plane for mounting the of housings, any of 14 locating plates

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The G-5 RADIUS DRESSER is a precision engineered tool that will dress either a convex or a concave radius from .015" to 1.750" on a 7 inch or 10 inch wheel, and it may be set to the exact radii desired. Graduated stops allow you to dress any desired portion of a radius.
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can be slipped in and fastened into position. The locating plates take into account minor variations in depths and diameters of the housings. Major variations in depth as well as major changes in diameters are adjusted for by moving the drilling and tapping units forward and backward. Hand wheels permit easy adjustment, and accuracy of location is assured by dowel pins which can be set to provide any of four major adjustments. Tool changes are made quickly in most cases through the use of pre-set tools.

In order to process the holes on the different castings which have varying hole locations, a six-position rotary table was necessary. On some parts, all positions are used, whereas on other parts several positions are skipped. A four-position selector switch on the electrical cabinet selects not only the positioning of the table but also which heads are to move forward.

National Automatic Tool Co., Inc., Richmond, Ind.

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Air-type oil cooler and reservoir combined

A combination hydraulic oil cooler and reservoir contains a radiator-like arrangement of tubes which, with the large headers, have a total usable capacity great enough to take the place of a conventional tank. When in use, the hot oil is drawn through the tube

CAMS

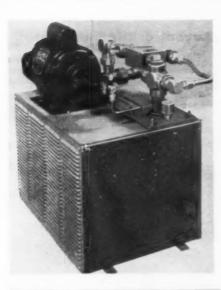
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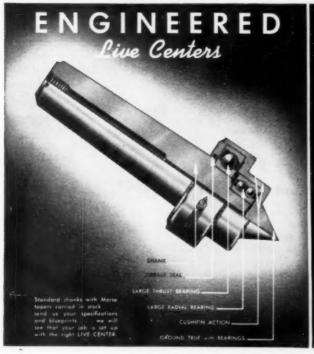
system and two electric fans force air over the tube surfaces to effect a heat transfer.

The unit pictured here has a heat transfer rating of 12 hp, with a capacity of only 5 quarts.

The Rosaen Co., Dept. BJ, 1776 East Nine Mile Rd., Hazel Park, Mich. Use postpaid card. Circle No. 116

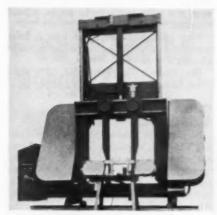
Band saw weighing 5,690 lbs.

A giant horizontal band saw weighing 5,690 lb. is said to cut a 24" round carbon log in less than one minute. Designated special model J-38, it will cut up to 40" rounds. The 1¼" blade is driven on four wheels at variable speeds from 300 to 2300' per minute. The cutting head is raised hydraulically on rollers to minimize friction and give a steadier feed. It can be built to meet individual specifications and with other





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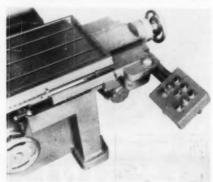
speeds by its manufacturer.

One of the firm's standard metalcutting band saws is pictured with the special model J-38 to show its huge size—122 inches wide, 122 inches high.

W. F. Wells and Sons, Dept. BB, North on 131, Three Rivers, Mich.

Layout drilling machine

By mounting a job rod on the table of the layout drilling machine for controlling longitudinal positioning, and another job rod on the carriage to control transverse positioning, any workpiece, regardless of the complex pattern of holes, can be produced rapidly and efficiently without the use of jigs



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Each job rod is bored with ¼" diameter holes at locations which correspond with the distance between the hole centers of the workpiece. Each hole in the workpiece is located by placing a Stop Pin in each rod. As a hole is finished, the pin is moved to the next hole and the table positioned to the next location.

Layout drilling machines for job rod use are equipped with micrometer dials and scales and three methods of table and carriage movement are available. Automatic positioning controls hole spacing by means of a single push button as illustrated. This button provides simultaneous longitudinal and transversal power rapid traverse to a point close to the final position where slow power traverse is automatically engaged and a

ten second creep cycle brings the table to the final position. The alternate power rapid traverse stops close to the final position and finish adjustment is made with the fine-feed hand wheel. Hand traverse is also available when this method is preferred.

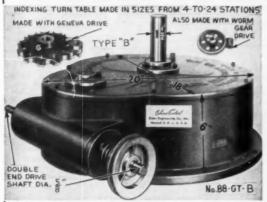
Cleereman Machine Tool Corporation, Dept. BB, 555 West Washington Blvd., Chicago 6, Ill.

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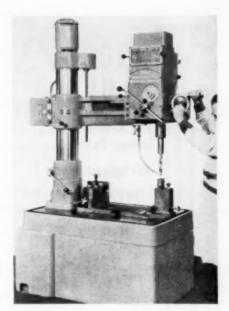
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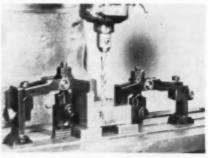
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The Stryker safety saw cuts wood, plastics, plaster, rubber, textiles, and soft metals by oscillation rather than rotation. This factor makes the saw safe to handle, as superficial contact with skin and clothing will not cause damage. There is claimed to be little danger from flying chips or broken blades, making a safety guard unnecessary.



Stryker safety saw is safe to handle.

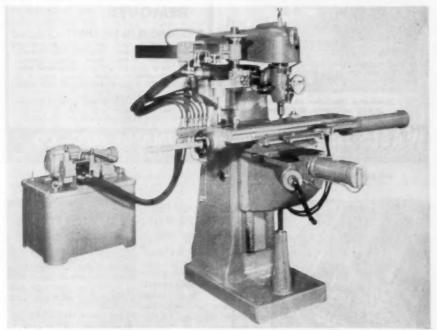
Stryker Mfg. Co., 420 Alcott Ave., Kalamazoo, Mich.

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Duplicating Attachment Equips Vertical Machine for Milling Irregular Contours

The U.S. vertical milling machine may now be equipped with a two-dimensional table and saddle Turchan duplicating attachment for following irregularly-shaped contours. The combination of the vertical's large capacity with the hydraulic two-dimensional tracer simplifies intricate profiling and contour machining.

The 20" x 10" duplicating attachment



U.S. vertical mill with two-dimensional Turchan duplicating attachment-simplifies profiling.

is complete with pencil type stylus, which the operator holds in contact with the ferrous or nonferrous master. The milling machine automatically follows the prescribed movements in both horizontal planes at the pre-determined optimum feed rate.

To facilitate setup, the longitudinal table feed screw is retained, permitting manual longitudinal table movement in

any position. An anti-backlash longitudinal table feed nut is provided to assure continuing accuracy.

Among the optional accessories are a magnetic stylus and an automatic rise and fall knee attachment coordinated to the movement of the table and saddle hydraulic cylinders.

Range and capacity of the vertical mill are in no way limited by the dupli-



VERTICAL

At last, a top quality industrial sander that provides all the most wanted \$89.95 features - yet sells for so little. complete with cord, plug, switch roady to use

> Illustrated Literature on Request A few desirable distributor territories still available.

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"DIXIE 'Micro-Finish' gives 10 to 20 times longer cutting life"

Users report lower tool costs because only Dixie has perfected an exclusive method of producing an ultra smooth micro-finish. These super sharp tools cut with less resistance reducing friction DIXIE TOOL INDUSTRIES and tool wear.



SEND FOR OUR **NEW CATALOG**

4555 W. FRANKLIN AVE. BRIDGEPORT, MICHIGAN cating attachment. The machine pictured has a 10" x 42" table and offers a choice of 24 different spindle speeds in a range from 65 to 2850 rpm.

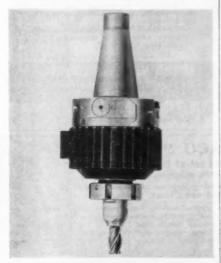
U.S. Burke Machine Tool Div., Dept. HS, Brotherton Rd. at Pennsylvania R.R., Cincinnati 27, O.

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End mill driver requires fewer specials

The new P.D.Q. end mill driver is said to offer a new concept in end mill cutting. It has a provision for offset positioning which produces an orbital motion of the cutting tool. This motion permits one-pass cutting of keyways with undersize end mills and partially eliminates the need for special diameter sizes. The orbital (or eccentric) motion also increases chip clearance, insures square slots and permits milling true-to-centerline on keyways, the manufacturer claims. The orbital motion has the same speed as the spindle.

The driver also has a four-to-one



End mill driver permits use of undersize tool.

METALLIZING ZINC WIRE

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for coiling tubes & bars



Illustrated is the CURVIT 150 coiling $\frac{1}{6}$ " x 1" steel edgeways. Circles from 8 inch to 8 foot diameter can be made without changing set-up. With another set of forming rolls the same can be done with 1 inch tubing.

Send us information on what you wish to bend so that we can reply intelligently instead of sending a form letter.

Curvit Corporation

R.D. 2, North Attleboro Massachusetts Myrtle 5-6211

speed ratio between the spindle and the cutter which enables the driver to do work while the machine loafs.

Driver accommodates end mill shank sizes from %" to 1". The eccentric micrometer positioning ranges from 0" to .062" off center,

Portage Double-Quick, Inc., 1037 Sweitzer Ave., Akron 11, Ohio.

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Precision digital index table

The Jacy index table has a solid mechanical lock with zero backlash which is automatically engaged in all index positions. This, plus the inherent accuracy, eliminates all need for multihole bushing plates normally used on circular rings and diameters on single spindle drilling operations. Compensation for size change of the workpiece



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Precision made of finest tool steel—Carefully heat treated and tempered for long life—.0025 undersize to facilitate use—Black oxide finish.

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Single sizes available.

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MACHINE and TOOL BLUE BOOK



due to fabrication or thermal conditions during manufacture, is easily made by the block indexing control feature or through the flexibility of the discrete positioning system.

These tables are rugged units moti-

vated by either hydraulic or electric drives. They will operate accurately and efficiently under substantial work loads for such machining operations as drilling, milling, boring and broaching. Available in 18", 24", 36" and 45" diameters—can be push button or punched tape programmed (numerically controlled) and is accurate to seconds of arc.

Modern Engineering Service Co., Dept. BJ, 1695 Twelve Mile Rd., Berkley, Mich.

Use postpaid card. Circle No. 120

Components raise production of basic machine

Catalog components can convert a basic machine to a modern high production machine or a special purpose installation. Usually, this involves the selection of a work head, a motorized spindle for grinding, milling, boring,





etc., along with a suitable slide or feed.

The unit illustrated represents a conversion on an existing steel mill roll grinder. The operation involved grinding of the 6" to 14" diameter journal on a roll 3' to 4' in diameter x 12' to 14' long. The basic machine incorporated a swivel for positioning of the illustrated assembly at the proper angle



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WITH FEATURES TO CUT PRODUCTION LOADED

QUICK ACTION," no cumbersome wrench, "RUGGED" for long life, Alcaling Country of the hard to hold jobs, "RANGE" for the extra capacity inishes, "ADAPTABILITY" for the hard to hold jobs, "RANGE" to stretch your budget. "RUGGED" for long life, "RIGID" for fine id jobs, "RANGE" for the extra capacity you



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Jaws 6-3/4" wide, 2-1/2" deep, opens to 6-3/4" Plain Vise \$95.00, with Swivel-base \$123.00 Your local distributor can supply YOU.

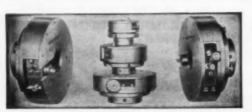
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Two-way Tool Feed-9, 12, 16, 20, 24, 30, 36, 40 and 46" sizes. Save many costly set-ups. Bulletin No. 4141 Gives Full Details

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for also grinding the taper on the journal.

This assembly is a "building-block" unit, each a catalog item: motorized spindle, wheel holder with balancing weights, wheel guard, compound feed consisting of 10" cross-slide and 20" longitudinal traverse with a commercial power cylinder.

The Standard Electrical Tool Co., 2488 River Rd., Cincinnati 4, O.

Use postpaid card, Circle No. 126

Rotary table and accessories

In addition to the regular 12" rotary table originally introduced, the manufacturer is now producing a 9" and 15" size. Both of these new models can be used horizontally as well as vertically. All models of the tables are now available with chucks and chuck adapters and with a new tailstock accessory that

HYBCO TAP GRINDER

Sharpens Chamfers, Flutes and Spiral Points



Model 1100

· Capacities No. 0 Machine Screw to 11/2" Hand Taps

HENRY P. BOGGIS & CO. 710 E. 163rd St. Cleveland 10, Ohio

Use postpaid card. Circle No. 477 December, 1957

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allows the tables to be used more effectively in the vertical position for holding work between centers.

Pictured is a Universal table equipped with chuck and tailstock for machining a serrated shaft.

Universal Vise and Tool Co., Dept. BJ, Parma, Mich.

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YEAR END SUPPLIES

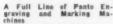
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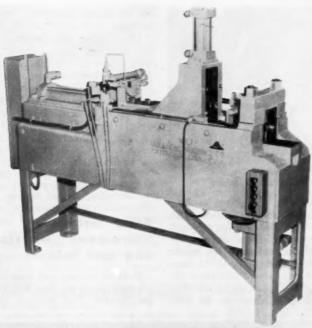
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MACHINE and TOOL BLUE BOOK



Vaill No. 7S tube end forming machine reduces or points the ends of tubing.

Tube End Forming Machinery Saves User \$1800 per Month

The double stroke No. 7S machine is the latest addition to the line of Vaill tube end forming machines. Completely hydraulically operated, the machine has a smooth, quiet motion that can be used for reducing or pointing

the ends of tubing. The tube is clamped in a pair of split blocks and a tapered ring is pushed over the end of the tube.

The two reducing rings shown in the close-up view of the tooling were



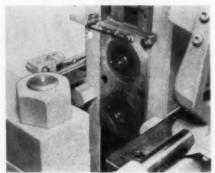
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Reducing rings for o.d. and i.d. forming.

made for reducing a 2½" o.d. x .049" wall welded steel steering column to an inside diameter of 1-7/16" for a length of approximately 7" long. Special attention should be called to the inside sizing mandrel that is used in conjunction with the second operation reducing ring. This inside sizing mandrel enables a close tolerance to be held

on the inside diameter of the reduced section.

After using this double stroke No. 7S machine, the customer estimated that it was saving them approximately \$1800 per month compared to their previous swaging equipment.

Machine can also be tooled up for expanding in diameter, flanging, flaring, double flaring and beading the ends of tubing. Combinations of these shapes may be obtained through the use of the double stroking feature.

The Vaill Engineering Co., 137 E.

Main St., Waterbury 20, Conn.

Use postpaid card. Circle No. 128

Solid carbide "thro-away" inserts and tool holders

Positive locking and ease of indexing are features in the new Wil-Dex Pentagon holder. The positive lock clamp



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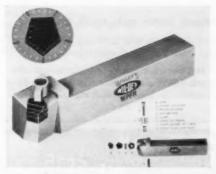






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for the insert and chip breaker is supported by an adjustable set screw at the rear of the clamp which positions the clamp for maximum clamp pressure when the clamp bolt is drawn tight.

The Pentagon insert has ten cutting edges. Improved tool geometry increases the tool life because the Pentagon permits a 30% lead angle which reduces the shock to the tool nose. This increase in the lead angle allows the tool to enter the cut more gradually and away from the nose of the insert. Willey's Carbide Tool Co., Dept. BJ, 1340 W. Vernor Hwy., Detroit 1, Mich. Use postpaid eard, Circle No. 130

Roll marking machine operates like air press

The Series 46, Model 487 Duomatic marking machine for roll marking aircraft engine turbine discs is comparable to an air or hydraulic press with characteristic vertical ram travel, which in this case provides the marking pressure with depth of mark controlled simply by air pressure as preset at a pressure regulator. In addition, the machine has an air operated die slide which accommodates the roll marking

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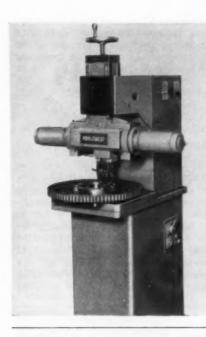
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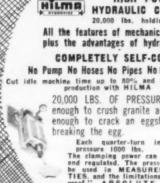
Duomatic machine marks aircraft turbine discs.

tools and travels laterally to perform the roll marking operation.

In operation, parts are placed on the work table and the foot control is depressed to initiate the machine cycle,



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MACHINE and TOOL BLUE BOOK

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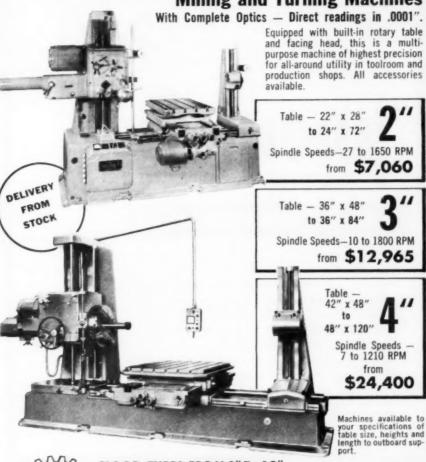


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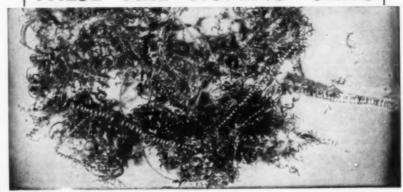
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0	40-44-48	9/16	16-20-24-27-28-30-32-40-48	1-0/0	16-18-20-24
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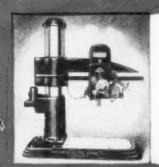
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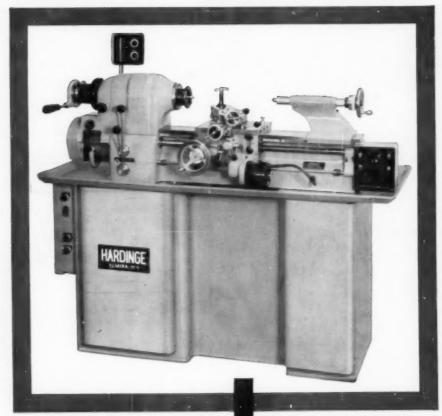
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